

Supplementary Volume No. I (Pt. I)

# STUDIES UNDERTAKEN BY THE EDUCATION COMMISSION



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**EDUCATION COMMISSION**  
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EDUCATION AND NATIONAL DEVELOPMENT

Report of the Education Commission  
(1964-66)

Supplementary Volume No. I

PART I

Professional, Vocational and Technical Education

EDUCATION COMMISSION  
MINISTRY OF EDUCATION : GOVERNMENT OF INDIA

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## PREFACE

I have great pleasure in presenting this first part of Supplementary Volume No. I of the Report of the Education Commission which contains papers on professional, vocational and technical education.

The first document included in this part is a study of the socio-economic background of students admitted to technical, vocational and professional institutions in 1965. This is one of the major studies conducted by the Education Commission and will be found both useful and interesting. I would like to place on record the Commission's appreciation of the work done in this study by Shri M.P. Balakrishnan, Research Officer of the Commission.

The next four studies were conducted by Shri S. Venkatesh, I.A.S., Deputy Educational Adviser to the Commission. The Commission would like to record its appreciation of this work.

Finally, the volume contains two papers on technical education. The first, which deals with vocational and technical education was prepared by Recteur J. Capelle, Consultant to the Education Commission. The second which deals with the educational levels of working force in Japan was prepared by Prof. S. Ihara, Member of the Education Commission. On behalf of the Education Commission I would like to convey our gratitude to these gentlemen for the trouble they have taken in preparing these documents.

New Delhi:  
30th June, 1966.

J.P. Naik  
Member-Secretary

I

SPECIAL STUDIES REGARDING  
PROFESSIONAL, VOCATIONAL AND TECHNICAL EDUCATION.

PROFESSIONAL, VOCATIONAL, AND TECHNICAL EDUCATION

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SOCIO-ECONOMIC BACKGROUND OF STUDENTS  
ADMITTED TO  
INSTITUTIONS OF PROFESSIONAL,  
TECHNICAL AND VOCATIONAL EDUCATION  
1965

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Introduction

1. With a view to study the socio-economic background of the students admitted to professional, vocational and technical institutions in the country and their relationship, if any, with the admission policies, the Education Commission collected data regarding the socio-economic background of students admitted in 1965 to the first year classes in the Institutes of Technology, Regional Engineering Colleges, Engineering Colleges, Medical Colleges, Agricultural Colleges, Polytechnics, Industrial Training Institutes and other Technical Institutions. The study covered 341 such institutions and 87,358 students (list annexed).

2. Data Called For : All institutions were asked to give information as to how many of the students admitted in the first year classes were from urban areas & from rural areas - the definition of a student coming from rural area being one who has completed his secondary school education in a rural area.

Information regarding the occupation of parents was asked for in five categories : (1) professionals; (ii) people in service; (iii) businessmen; (iv) agriculturists; and (v) others.

Students were also required to indicate the monthly income of their parents in four categories: as between Re.1 and 150; Rs.151 and 300; Rs.301 and 500;

and above Rs.500.

3. The analysis of the data thus collected is given in the paragraphs that follow.

4. Indian Institutes of Technology : All the five IITs furnished the Commission with the required data which has been tabulated in Table Nos. 1-4, Annexure I.

FINDINGS : The analysis revealed that :-

(1) 87.2 per cent of the students admitted, belong to urban areas. The position is not very different in any of the five IITs except perhaps in Madras where a little over 20% of the students have been admitted from rural areas.

(2) 88.5 per cent of the students admitted are children of professionals like Doctors, Engineers and people in service and business. It is further seen that over 60 per cent of the seats have gone to children of people in service alone.

(3) Only 6.9 per cent of the seats have gone to pupils whose parents draw less than Rs.150 a month.

Present Position of Admissions : Admission to these Institutes is granted on merit, as judged on the result of a written joint common entrance examination followed by an interview granted to the candidates successful at the written examination. These examinations are held in Bombay, Delhi, Kanpur, Kharagpur and Madras, and the seats have been distributed on a zonal basis covering the entire country among these five centres.

Out of 2,133 students who qualified for admission in 1965, as many as 1,725 did not want to leave their own zones and preferred admission in the IIT of the zone to which they belonged. It is also seen that the majority of the students who qualified in the entrance examination belong to the State where the Institute is located.

The following extract from a letter from a Director of the Institute shows the advantage which students from English medium schools have in the entrance examination:

"I should mention also in this connection that I find that even though English medium school or schools, which have English medium Sections, are very few in our country, the boys from these Schools do very well in our entrance examination and get in. For example, this year as many as 168 out of 456 have come from the English medium schools passing either the Higher Secondary or Indian School Certificate or similar examinations. One reason of course is that these Schools are good Schools and another, they draw students from higher income groups."

5. Regional Engineering Colleges : A study of 2,425 students admitted to 7 Regional Engineering Colleges in the country indicates that the majority of students admitted are from urban areas (58.8 p.c.) though the position of rural is comparatively better than in the Institutes of Technology (Annexure I Table No,5).

On closer scrutiny, it was found that in Mysore and Orissa, it has been possible to admit 61.1 per cent and 55.2 per cent respectively of students from rural areas. In Andhra Pradesh, 45.4 per cent of the students admitted are from rural areas. The improvement in Mysore



and Orissa is largely due to the fact that nearly half the seats are reserved for socially and educationally backward classes. In Andhra Pradesh, seats are distributed regionwise on a population basis.

Admission Procedure : In the case of Regional Colleges which are operating as a Centrally sponsored scheme, 50% of the seats are reserved to the candidates belonging to the State where the College is located. The remaining 50% are distributed among the other States broadly on the basis of population.

It is, however, seen that nearly two-thirds of the seats have gone to children of professionals, people in service and business. It is again only in Andhra Pradesh, Mysore and Orissa that a large number of students who are children of agriculturists has been admitted to these colleges and there is, therefore, a definite improvement in the coverage of students from rural areas. This also explains why it has been possible for nearly one-third of the admission to be given to children of parents whose monthly income is less than Rs.150.

6. Engineering Colleges : A study of 15,144 students admitted in 48 Engineering Colleges in the country shows that the position of rural areas is worse than in the Regional Colleges. 65.9 per cent of the students admitted to the Engineering Colleges come from urban areas and only 34.1 per cent come from rural areas (Annexure I Table 6).

There are, however, some States where the coverage from rural areas is much larger. In Assam, Andhra Pradesh, Bihar, Kerala and Orissa, the percentages of rural coverage are over 50%. In all these States selection is made on a State-wide basis and measures have also been taken to improve the rural coverage. (For admission procedure see summary statement and details given in pages 11-46). While in the case of Assam, the improvement is due also to grace marks allowed for Scheduled Castes, Scheduled Tribes and other Backward Classes, in Kerala, the seats are divided in a certain proportion to ensure adequate coverage between various regions in the State and reservation is as high as 48%. In Mysore and Orissa also reservation is on the high side. In Andhra Pradesh, though the reservation of seats is only about 20%, over 50% of the seats have gone to candidates from rural areas and this has been possible mainly due to the admission policy followed by the State Government whereby the seats are distributed on a population basis in regions and zones of the State and a State-wide coverage has thus been attempted by dividing the State into regions and zones and seats in proportion to the number of candidates available as from PUC, H.S.C. and Senior Cambridge.

Nearly two-third of the seats, however, in all the 48 Engineering Colleges studied by the Commission have gone to children of professionals and

people in service and business (Table No.6-a). Only less than 25% of the seats have gone to children of people having agriculture as their occupation, though it is gratifying to note that this percentage is more than 40 in Andhra Pradesh, Bihar and Orissa.

It is also seen that 38.7 per cent of the seats have gone to pupils whose parents have a monthly income of less than Rs.150 which is an improvement in comparison with IITs and even Regional Colleges (Table No.6-b).

7. Medical Colleges : It is seen that in the case of Medical Colleges including Pharmacy, Dentistry, etc. 68.2 per cent of the seats go to students coming from urban areas (Table No.7). It is also significant to note that in Andhra Pradesh, Gujarat, Orissa and Uttar Pradesh more than 50 per cent of the seats have gone to the students from rural areas and in Orissa this percentage is as high as 82.2.

It is, however, common trend to note here also that nearly two-third of the seats in Medical Colleges have been shared by children of Doctors, Engineers, people in service and business. Further it has to be noted that children of agriculturists in the States of Gujarat, Mysore, Orissa and U.P. have also got more than a third of the seats (Table 7-a).

While examining the income of parents of the students admitted to Medical Colleges it is seen that nearly one-third of the seats have gone to those getting less than Rs.150 a month (Table 7-b). This cannot be considered unsatisfactory.

8. Agricultural Colleges : A study of admissions to eight Agricultural Colleges in the country shows (Table No.9) that 59 per cent of the seats have gone to students from rural areas and only a third of the seats have gone to children of Doctors, Engineers, people in service and business.

The majority of the seats have gone to the children of agriculturists themselves. Only 3.8 per cent of the students admitted to these colleges come from families earning more than Rs.500 a month and nearly 60 per cent of the seats are shared by children of parents whose monthly income is less than Rs.150. From one point of view, it is a trend in the right direction. From another, it means that careers in agriculture are not yet sufficiently attractive.

9. Polytechnics : In the Commission's study, 172 polytechnics and 47,900 students were covered and it has revealed that 55.6 per cent of the students admitted come from urban areas (Table No.10). A State-wise analysis, however, shows that in Kerala and Orissa the number of students coming from rural areas was very impressive, their percentages being 81.2 and 72.7 respectively. In Mysore and Manipur these percentages were 52.5 and 63.3. In Andhra Pradesh, Bihar, Madhya Pradesh, Madras, Punjab, Uttar Pradesh and West Bengal more than 40 per cent of the students come from rural areas. This indicates that the coverage of rural population at the polytechnic level has improved very much in comparison with courses at the degree level. This may

he partly due to the admission policy adopted by the State Government to ensure as wide a coverage in the State as possible. (Pl. see pages 16-18). It may not be wrong, however, to infer that preference by candidates from urban areas is not so pronounced at the diploma level as it is at the degree level.

Only 7.7 per cent of these seats have gone to children of professionals like Doctors and Engineers. (Table No. 10-A) in Andhra Pradesh, Bihar, Kerala, Mysore, and Orissa more than a third of the students admitted are children of agriculturists. It is also seen that one-third of the total number of students admitted are children of people in service.

The income level of the parents of the students admitted to polytechnics indicates that the majority of them are in the income group of less than Rs. 150 a month (Table No. 10-b). In other words, the polytechnical courses are not so paying and, therefore, the higher income groups are not attracted to them to the extent they are attracted to other prestige courses. Only 7 per cent of the candidates belong to the income-group of over Rs. 500 per month. It is also significant to note here that in Mysore 76.6 per cent of the seats go to children of parents who have income of less than Rs. 150 a month.

10. Industrial Training Institutes: Only 7,399 students and 28 institutions could be covered in this study which is not a happy response. Nonetheless this shows that only 0.2 per cent of the seats have gone to well-to-do people and 83 per cent of the seats have gone to children of parents having an income of less than Rs. 150 a month and only a third of

such seats have gone to children of professionals, people in service and business (Table No.11).

No definite conclusions are necessary to be drawn from the study covered by other technical institutions. Since many of these institutions do provide for courses which have ready employment market, the general trend that 'the majority of seats go to the people from urban areas' holds good in this case also.

11. Other Technical Institutions : The data received from a few other institutions of technical education not covered in the categories already enumerated is given in Table Nos.12(a), 12(b) and 12(c).

M.P. Balakrishnan  
Research Officer

SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED TO  
TECHNICAL, VOCATIONAL & PROFESSIONAL EDUCATIONAL  
INSTITUTIONS (in 1965)

(A) Admissions to Engineering Colleges  
in the States - 1965

<u>Name of the State</u>	<u>Admission Procedure</u>	<u>Reservation</u>
Andhra Pradesh	Admissions are made on a population basis in the two regions of Andhra and Telangana and then distributed zone-wise as below:  Andhra Region Northern Zone - 21% Central Zone - 42% Southern Zone - 37%	18% for Scheduled Castes and Scheduled Tribes (14% for Scheduled Castes and 4% for Scheduled Tribes), 3% for children of displaced goldsmiths and a maximum of 5% for N.C.C., A.C.C. and sportsmen.

The seats in Engineering Colleges in this region are divided in the ratio of number of candidates appearing for P.U.C. and Higher Secondary - 5 seats having been reserved for Senior Cambridge students with Mathematics and Physical Sciences.

Telangana Region.  
City Zone - 30%  
District Zone - 70%

In this region, at least 1/3rd of the seats in all categories are to be given to the Higher Secondary candidates and Senior Cambridge candidates and at least 50% of the total seats to P.U.C.

In the case of Sri Venkateswara University, 80% of the seats are filled without interview by P.U.C. and H.S.C. candidates on the basis of marks secured and the remaining seats reserved for certain sections of people. 5% of the seats for candidates with special abilities and the remaining 15% for Scheduled Castes and Tribes. In the case of Andhra University, the reservation for Scheduled Castes & Scheduled Tribes and Backward classes varies from 20 to 41%.

In the case of Regional Engineering College, 50% of the seats for candidates from other States and the remaining half divided between Andhra and Telengana Region in the ratio 2:1.

Assam

Admissions are made on the basis of the result of a competitive examination held for the purpose.

2 seats for J&K, 7 for Manipur, 1 for Tripura, 6 for Nagaland. 7% of the remaining seats for Scheduled Castes, 10% for Scheduled Tribes plains, 12% for Scheduled Tribes hills. It is, however, necessary for the candidates applying for reserved seats to qualify in the written test for admission. Grace marks up to 10% of the total marks will be given to these candidates. If they do not qualify in the written test, these reserved seats will be allotted to the open quota.

If, however, in spite of the grace marks, these candidates

Bihar

Admissions are generally based on merits determined at the qualifying examinations.

8% for Scheduled Castes, 7% Scheduled Tribes and 10% Backward Classes. But for Muzaffarpur Technological Institute, 30% of the seats are reserved for Scheduled Castes, Scheduled Tribes and other backward classes.

In the case of Birla Institute of Technology at Ranchi, seats are distributed State-wise reserving 53% for foreign students and 20 for trust nominees out of 270 seats.



Gujarat	Admission based purely on a merit list determined by the marks obtained at the qualifying examination and merit marks prescribed under rules.	20% of the seats reserved for Scheduled Castes and Scheduled Tribes and nomadic tribes and denotified tribes.
Jammu & Kashmir	Admission is made generally on the basis of merit decided by marks obtained at the qualifying examination.	50% of the seats in the Regional Engineering College are reserved for candidates from the J&K State.
Kerala	Admission is made on the basis of selection made by a Selection Committee.	4 seats for Central Government nominees, 2 seats for J&K, 1 for L. & M.A. Islands, 5 seats for each of the neighbouring States - Madras, Mysore and Andhra Pradesh - on a reciprocal basis. 10% of the seats will be filled purely on merit on a State-wide basis. 50% of the seats will be filled purely on merit on a State-wide basis. 50% of the seats will be allocated between Malabar and Travancore Cochin area in the ratio 5:3. The remaining 40% of the seats will be reserved for backward communities and scheduled castes and scheduled tribes to be distributed @ 13% for Ezhvas, 9% for Muslims, 3% for Roman Catholics, 9% other backward Hindus, 1% other backward Christians, 5% scheduled castes and scheduled tribes. If duly qualified candidates are not available for filling up the reserved quota, they will be filled on the basis of merit.

<u>Name of the State</u>	<u>Admission Procedure</u>	<u>Reservation</u>
Madhya Pradesh	Admission is made on the basis of a State-wide pool basis.	15% for students of scheduled castes, 15% for scheduled tribes, 3% for children of goldsmiths affected by Gold Control Order, 15 seats for nominees of Her Highness Rajamata Scindia, Gwalior. Reservations are also made for children of service people in Goa, J&K, N.E.F.A. whose Nos. are not fixed in advance.
Madras	Admission is made by a Selection Committee after interviewing all eligible candidates.	A certain number of seats are reserved for other States and countries. The remaining seats are divided into three pools - General Pool, Backward Pool and Scheduled Castes and Scheduled Tribes Pool - and the seats are distributed in the ratio of 59%, 25% and 16% respectively. The seats allotted to the General Pool are distributed among the various districts on the basis of population. Preference is given to a candidate of a particular district for admission to the Technical Institution in that district.
Maharashtra	Open seats available for general pool are distributed among the candidates passing from the various universities in the State in the proportion of the number of students registering for the I.Sc. or its equivalent examination. After arriving at a quota of each university on the above basis, a merit list of qualified students applying for admission is prepared in order of merit and admissions are offered to the students from the list till the quota of that particular university is full. The minimum	Reservation at present existing provides 12% of the seats for scheduled castes and Nava-Budhas, 8% for scheduled tribes and 4% for Vimukta Jatis and nomadic tribes and 6% for other backward classes.

<u>Name of the State</u>	<u>Admission Procedure</u>	<u>Reservation</u>
	percentage prescribed for admission is 45% of the qualifying examination.	
Mysore	The selection is made by a Selection Committee.	<p>The following reservations are, however, made :-</p> <p>16% for Scheduled Castes 3% for Scheduled Tribes 30% for Backward Classes</p> <p>The Colleges in the private sector who do not receive any Government grant give admissions on the basis of marks secured at the qualifying examination by paying a substantial amount to the development of the institution by the parents of the candidates.</p>
Punjab	Admission to Engineering Colleges is made by the Colleges concerned on the basis of University marks.	Seats are allocated for Scheduled Castes & Scheduled Tribes, Backward Classes, Backward areas, sportsmen, Himachal Pradesh candidates, South-East Asia region, J&K, students from abroad, Ramgarhia communities, self-financing students and students hailing from rural areas.
Rajasthan	Admissions are made on the basis of marks secured in the qualifying examination. In the case of the Regional Engineering College 50% of the seats are for candidates belonging to the State. The remaining 50% is being distributed among other States.	About 20% of the seats are reserved for candidates belonging to Scheduled Castes and Scheduled Tribes. 50% of the seats in various courses are reserved for bonafide residents of Rajasthan or displaced persons registered by Jodhpur University.

<u>Name of the State</u>	<u>Admission Procedure</u>	<u>Reservation</u>
Uttar Pradesh	Students are admitted generally on the basis of merit though the admission procedure of each Engineering College has no uniform pattern.	In the Dayal Bagh Engineering College, 50% of the seats are reserved for candidates from U.P. In the Regional Engineering College, Allahabad 50% of the seats are reserved for students from U.P. including 5 for border areas and 5 for Scheduled Castes and Scheduled Tribes and the remaining seats are distributed among the other States. In the Banaras Hindu University Engineering College, seats are reserved State-wise though 81 seats have been reserved for U.P. out of 270. In the case of Gorakhpur University 12 seats are reserved for Scheduled Castes and Scheduled Tribes, etc.
West Bengal	Admissions are made by the West Bengal Board of Examinations on the basis of a competitive examination held for the purpose for all Engineering Colleges except Jadavpur where admission is made on the basis of merit decided by the marks secured at the qualifying examination and interview.	There is no system of reservation of seats for any group or community. In the case of Jadavpur University some seats are reserved State-wise. In the University of Calcutta for courses like leather technology, 20 of the seats are reserved for Scheduled Castes.
Delhi	Admission is generally made on the basis of merit decided by the marks obtained at the qualifying examination.	10 of the seats are reserved for educationally deficient States. 20% are reserved for Scheduled Castes and Scheduled Tribes and other Backward Classes.

(B) ADMISSION TO POLYTECHNICS IN STATES - 1965

<u>Name of the State</u>	<u>Admission Procedure</u>	<u>Reservations</u>
Andhra Pradesh	The State is divided into two regions - Andhra and Telengana and seats distributed on a zonal basis on the basis of population. Admission is based on merits decided by the marks secured at the qualifying examination. In the case of non-Government Polytechnics admissions are made by a Selection Committee generally following the procedure adopted by the State Government.	18% of the seats reserved for Scheduled Castes and Scheduled Tribes - 14% Scheduled Castes and 4% for Scheduled Tribes - interchangeable. 3% reserved for children of displaced goldsmiths and 5% for candidates of NCC, ACC etc.
Assam	Admissions to Polytechnics and other diploma institutions is made on the basis of a competitive admission test held for the purpose.	Seats are reserved for J&K, Manipur, Tripura and Nagaland. 7% of the seats reserved for Scheduled Castes, 10% Scheduled Tribes Plains and 12% Scheduled Tribes Hills.
Gujarat	Admissions are made at individual Polytechnic level purely on merit determined by the marks obtained at the qualifying examination and adding prescribed merit marks is admissible under the rules.	20% of the seats reserved for Scheduled Castes/Tribes/Nomadic Tribes/Denotified Tribes.
Kerala	Admission to Polytechnics is made by a Selection Committee.	10% of the seats reserved exclusively for Junior Technical School Leaving Certificate Holders, 10% to the purely on merit on a State-wide basis, 40% to be allotted between Malabar and Travancore-Cochin in the ratio 5:8 and the remaining 40% allotted for backward communities in a prescribed ratio.

<u>Name of the State</u>	<u>Admission Procedure</u>	<u>Reservations</u>
Madhya Pradesh	Admission to Polytechnics is made by a joint Committee of Principals of Polytechnics in the State by drawing up a pooled merit list and distributing candidates according to institutions.	Reservation: 15% of the seats for Scheduled Castes, 15% Scheduled Tribes, 3% for Goldsmiths' Children affected by Gold Control Order.
Madras	Admission to Polytechnics is made at Polytechnic level by a Selection Committee and tabulated mark list in order of merit is passed on to the Director of Technical Education for final selection. Marks are allotted for interview also. Preference is given to candidates of a particular district for admission to the Polytechnic of that District.	16% for Scheduled Castes and Scheduled Tribes for socially and educationally backward classes.
Maharashtra	After subtracting the seats reserved for Scheduled Castes and Scheduled Tribes, Navbudhas and other backward classes, the remaining are filled from other qualified candidates on their inter se merits which is decided by a formula prescribed by the State Government.	12% of the seats are reserved for Scheduled Castes and Navbudhas and 8% for Scheduled Tribes and 4% for Nomadic Tribes and 6% for other backward classes.
Mysore	Admission is made by a Selection Committee for each institution on the basis of a merit list prepared by providing marks for interview also.	A few seats for scholars from other States and countries, 2½% for children of Defence personnel, 15% for students passing the 10th standard with the required Technical subjects as optional. The remaining seats are distributed - 15% for Scheduled Castes, 3% for

<u>Name of the State</u>	<u>Admission Procedure</u>	<u>Reservations</u>
		Scheduled Tribes, 13% for social and economically backward classes and 15% for merit pool.
Punjab	Admission is made purely on merit on the basis of marks obtained by the candidates through a common Selection Committee after pooling all the seats of Polytechnics.	Seats are allocated among the following categories - Scheduled Castes, Scheduled Tribes, Backward Classes, Himachal Pradesh candidates etc. by the Department.
Rajasthan	Admissions are made on the basis of marks obtained in the High School Examination.	15% of the seats for Scheduled Castes and 5% for Scheduled Tribes.
Uttar Pradesh	Admissions are made directly by the Principal but no candidate who does not have the minimum educational qualifications is admitted.	25% of the seats reserved for Scheduled Castes students, 12 seats for students from border areas, 5% of the seats for children of Goldsmiths affected by the Gold Control Order. 1 out of every student admitted for sons and wards of political sufferers, 3 seats for J&K, 1 out of 60 seats for children of military persons.
West Bengal	Admission is made on the basis of an oral test of candidates who have passed a qualifying examination.	No reservation.

(c) SYSTEM OF ADMISSION TO INSTITUTIONS OF  
TECHNICAL AND VOCATIONAL EDUCATION IN  
THE STATES..

ANDHRA PRADESH

Government Engineering Colleges:

Admissions are governed by procedure as approved by the State Government. The State has been divided into two regions, namely, Andhra and Telengana for purposes of admission to engineering colleges. These two regions are again sub-divided into zones and admissions are made on the population basis as below:-

Andhra region North Zone	:	21%
Central Zone	:	42%
Southern Zone	:	37%
Telengana region City Zone	:	30%
District Zone	:	70%

The seats in the engineering colleges of the Andhra region are also divided in the ratio of the number of candidates appearing for P.U.C. and higher secondary course. 5 seats having been reserved for Senior Cambridge students who have offered Mathematics and Physical Sciences.

In the Telengana region at least one-third of the seats in all categories are to be given to the Higher Secondary and Senior Cambridge candidates, and at least 50% of the total seats to P.U.C. candidates. In case Higher Secondary, Senior Cambridge and P.U.C. candidates fail to get the minimum quota of seats fixed for them the number would be made up by admitting corresponding number of Higher Secondary, Senior Cambridge and P.U.C., as the case may be, who are otherwise qualified.



Non-Government Engineering Colleges:

In the Sri Venkateswara University Engineering College 80% of the seats are filled without interview by P.U.C. candidates of the Venkateswara University or Higher Secondary candidates who have studied in a school under the jurisdiction of the said university and have taken the examination conducted by the Andhra Pradesh Board of Higher Secondary Education, on the basis of their achievements in the qualifying examination. 5% of the seats are allotted for candidates with special abilities in extra-curricular activities, provided they are either P.U.C. candidates of the Venkateswara University or Higher Secondary candidates within the jurisdiction of the University. The remaining 15% are allotted to candidates who are Scheduled Castes or Scheduled Tribes and who have passed the qualifying examination.

In the Engineering College of Osmania University the admission is regulated more or less on the lines on which the students are admitted to Government engineering Colleges in the State. A limited number of seats, however, is reserved for students under the Colombo Plan and students nominated by other States or sponsored by the Government of India.

In the Centrally administered Regional Engineering College at Warrangal 50% of the seats are made available to candidates from other States. The remaining 50% of the seats are shared by candidates from Andhra and Telengana regions in the ratio of 2:1.

### Reservation of Seats

18% of the seats are reserved for Scheduled Castes and Scheduled Tribes with a distinct reservation of 14% for Scheduled Castes and 4% for Scheduled Tribes in the Government Colleges. This reservation is inter-changeable and if sufficient number of candidates in one category is not available they may be filled in by the other category. 3% of the seats are reserved for candidates who are children of displaced goldsmiths. As far as Telengana region is concerned this reservation is restricted to 1% of the seats. A maximum of 5% of the seats are reserved for candidates of N.C.C., A.C.C., sportsmen etc.

### Polytechnics

Government: The admission rules for government polytechnics are the same as those for admission to engineering colleges.

Private: In the case of non-government polytechnics admissions are made by a Selection Committee consisting of a nominee of the State Government, a member of the governing body of the institutions and the member of the institution concerned. In selecting candidates the following particulars are taken into consideration by the selection Committee:-

- i) Personality;
- ii) Aptitude;
- iii) Ability of expression;
- iv) Extra-curricular activities;
- v) Physical disability, if any.

The Government rules regarding allocation of seats between Andhra and Telengana region and also

reservation of seats for other categories of people are generally observed by these institutions.

ASSAM

Engineering Colleges - Government & Private:

The Admission to the Engineering Colleges is made in the State on the basis of competitive admission test held for the purpose. For the Engineering Colleges the candidates are tested in Physics, Chemistry, Mathematics and English. Such of the candidates who have passed higher secondary examination in science streams or P.U.C. examination in science or Senior Cambridge examination with Science subjects or any other equivalent examination in Second Division are all eligible to take the test.

Reservation

Reservations of seats are made for students outside the State and for Scheduled Castes and Scheduled Tribes candidates as indicated below:

For students outside the State:

Jammu & Kashmir	-	2 seats in Civil Engineering
Manipur	-	7 seats (3 Civil, 2 Mechanical & 2 in Electrical Engineering).
Tripura	-	1 seat in Civil Engineering
Nagaland	-	6 seats (2 Civil, 2 Mechanical and 2 in Electrical Engineering).

For Scheduled Castes & Scheduled Tribes:

Scheduled Castes :	7%
Scheduled Tribes :	10%
Plains; and	
<u>Scheduled Tribes :</u>	<u>12%</u>

to students of Scheduled Castes and Scheduled Tribes candidates for filling up the reserved seats. If, however, these candidates cannot qualify for the written test in spite of this grace marks, the seats reserved for them are thrown open to the general quota.

Admission Procedure for Diploma Institutions - Polytechnics, etc.

The admission procedure for Diploma Institutions is exactly the same as for Engineering Colleges.

Gujarat

Engineering Colleges

1. Government

Admissions to Government Engineering Colleges in the State are made purely on merit determined by the marks obtained at the qualifying examinations plus the prescribed merit marks as below:-

Additions

For Grade I at SSLC at first attempt	- 10 marks
First-class PUC	- 5 marks
Inter-Collegiate sports, athletics, aquatics, dramatics etc.	- 10 marks
Passing SSLC with three technical subjects	- 30 marks
50% or more marks at first year diploma examination of the Department of Technical Education/Gujarat State.	
<u>Weightage</u>	
For 50% to 55%	- 15 marks
For 55% to 60%	- 20 marks
For 60% to 70%	- 25 marks
For 70% and above	- 30 marks

Thus a merit card is prepared for each student bringing out his total merit marks on the card itself.

and admission is made from the selection list directly thus maintained. Admission to Government Engineering College and for the State quota of seats for the Regional Engineering Colleges is made on the basis of this common merit list.

## 2. Non-Government

So far as admissions to non-Government Engineering Colleges at the 1st degree level are concerned the two private Engineering Colleges at Valabh Vidyanagar, Anand and Baroda regulate their admissions on the performance of the candidates in the competitive selection examination held by the institution itself for this purpose.

### Reservations

The Government Engineering Colleges have 20% of the seats reserved for Scheduled Castes/Scheduled Tribes/Nomadic Tribes/ Denotified tribes. The private Engineering College at Baroda makes similar reservations of 20% for these tribes but the Engineering College at Valabh Vidyanagar, Anand reserves only 17 seats for this purpose.

### Polytechnics

The system of admission for polytechnics, both Government and non-Government are the same as followed for Government Engineering Colleges in the State but the admissions are made at individual polytechnic level.

## KERALA

### Engineering Colleges - Government/Private

Admission to all the Engineering Colleges, Government/Private are made according to the procedure prescribed by the State Government as below:-

A Selection Committee headed by the Director of Technical Education, Chief Engineer, PWD, Chief Engineer, Kerala State Electricity Board, Registrar,

University of Kerala and all the Principals of the Engineering Colleges is in charge of the selection of the candidates.

The Selection Committee will select candidates for all the seats in Government Colleges and 85% of the seats for private institutions. The remaining 15% of the seats in non-Government colleges will be filled by the management concerned from among the eligible applicants who have applied to the Director of Technical Education in response to his notification calling for admission to Engineering Colleges. The annual intake in Engineering Colleges being 840 in the year 1965-66; 10% of the seats will be filled purely on merit on a State-wide basis, 50% of the seats will be allocated between the Malabar and Travancore-Cochin area in the ratio of 5:8. The remaining 40% of the seats will be reserved for the backward communities and Scheduled Castes and Scheduled Tribes.

#### Reservation

Four seats for Central Government nominees, 2 seats for Jammu & Kashmir State and 1 seat for L&M Islands will be reserved in the Government Engineering Colleges and 5 seats in the Polytechnics will be filled up by eminent athletes and sportsmen on the recommendations of the Kerala Sports Council, 5 seats for each of the neighbouring States in the south zone, namely, Madras, Mysore and Andhra Pradesh, will be reserved in the Engineering Colleges in the State provided these States agree to reserve an equal

number of seats in their Engineering Colleges on reciprocal basis, one seat in Automobile Engineering for Jammu & Kashmir at the Government Polytechnic, Kalamassery, 5 seats for L & M Islands in the Polytechnic, Calicut and 3 seats for Maharashtra State candidates in the Polytechnic in Cannanore will also be reserved.

Scheduled Castes and Scheduled Tribes

The reservation quota of 40% will be according to the following formula:

Ezhavas	-	13%
Muslims	-	9%
Latin Catholics	-	3%
Other backward Hindus	-	9%
Other Backward Christians	-	1%
Scheduled Castes, Scheduled Tribes	-	5%

If in spite of the seats reserved for Scheduled Castes, Scheduled Tribes and Backward Communities suitable and duly qualified candidates are not available, those seats will be filled on the basis of merit. Similarly if any of the seats reserved for Junior Technical School-leaving Certificate-holders are vacant, they also will be filled on the basis of merit.

Polytechnics

The selection of candidates to all Polytechnics in the State (8 Government and 6 non-Government) are made by a Selection Committee headed by the Director of the Technical Education, Principals of all the

Polytechnics, Principal of the Institute of Textile Technology, Trivandrum. Selection of the candidates is made as to the Engineering Colleges. For the Polytechnics, however, 10% of the seats will be reserved exclusively for the Junior Technical School-leaving Certificate-Holders for joining the Polytechnics, 10% of the seats will be filled up purely on merit on State-wide basis, 40% of the seats will be allocated between Malabar and Travancore-Cochin area in the ratio 5 : 8. The remaining 40% of the seats will be reserved for the backward communities as in the case of the Engineering Colleges.

Students who have failed thrice either in the pre-professional Engineering or in the 1st year of the integrated course of Engineering will not be eligible for admission to any of the Engineering Colleges. The allocation of courses of study to the selected candidates will be made by the Members bearing in mind the preference indicated by the candidates at the time of applying and also depending upon his performance.

Minimum marks required for admission to Engineering Colleges is 50% for Mathematics and 50% for Physics and Chemistry put together with a usual reduction of 5% for backward communities, Scheduled Castes and Scheduled Tribes. The marks secured by the candidates in the pre-University examination alone will be taken into consideration in making the selection for admission to Engineering Colleges. In the case of a tie, marks in Mathematics will count. If there is still a tie, marks in Physics will count.



Where a tie still exists marks in English will be the deciding factor. In the case of admission to Polytechnics, selection will be made on the basis of the candidates performance in Mathematics and Science taken together. In the case of a tie marks in Mathematics will be taken separately into account and in case there is still a tie, marks in English will be considered. A candidate who has passed the pre-University class or equivalent examination with better performance in PUC compared to his performance in the SSLC shall not be at a disadvantage in the matter of admissions to Polytechnics. In such cases the marks of the candidates in Mathematics and Science put together in either of the examinations whichever is advantageous to the candidate shall be reckoned for admission.

#### MADHYA PRADESH

##### Engineering Colleges

Admission to all Engineering Colleges except the Regional Engineering College are made on the State-wide pool basis.

##### Procedure

Candidates should have studied in recognised institutions in the State during the two years immediately preceding the year in which admission is sought or 3 years at any stage. This is not applicable to sons and wards of State and Central Government servants stationed in Madhya Pradesh and sons and wards of serving service people or such personnel killed or disabled in emergency action.

Candidates must pass at least in 2nd class in the Higher Secondary School Certificate Examination or its equivalent and must have further obtained at least 55% marks in Physics, Chemistry and Mathematics. The candidates must be between 16 to 20. Upper age-limit is relaxable upto 3 years in the case of children of Scheduled Castes and Scheduled Tribes.

Admission to the 1st year courses is made as follows:

By preparing a Merit list, percentage of marks obtained by candidates in Physics, Chemistry and Mathematics in the prescribed qualifying examination - 100, for higher educational qualifications - 10, for candidates who have come from technical stream through regular technical institutions - 5. After applications are scrutinised in various colleges a joint meeting of all the Principals of Engineering Colleges considers these merit lists and prepares a master statement for the whole State for admission to different colleges according to preference.

#### Reservation of Seats

15% of the total seats in each Engineering college are reserved for students belonging to Scheduled Castes and another 15% for Scheduled Tribes. In addition 3% of the seats are reserved for children of goldsmiths affected by the Gold Control Order, 3% of the seats for sons and wards of political sufferers and freedom fighters. Besides 10 seats in the M.E. College, Gwalior, 5 seats in the SAT Institute, Vidisha

are reserved for nominees of Her Highness Rajamata Scindia, Gwalior.

Further, 10 seats are reserved for students of Vidisha District in SAT Institute, Vidisha.

There are also reservation of seats for sons and wards of serving service people in Goa, Jammu & Kashmir State nominees and Nepal Government nominees whose numbers are not fixed in advance.

The candidates have to apply separately to each of the Engineering Colleges. He has also to indicate in each application other colleges in order of preference where he wishes to be considered for admission. The candidate who does not apply to a particular college will not be considered for admission to that college.

#### Admission to Polytechnics

The Polytechnics in the State follow a five semester programme of instruction, each semester lasting for half a year.

#### Procedure

Candidates must have studied in a recognised institution for at least one year immediately preceding the year in which admission is sought or 3 years at any stage. This condition is not applicable to candidates who are sons and wards of Central Government servants stationed in Madhya Pradesh or those of serving service personnel under certain conditions.

Candidates must have passed the Secondary School Certificate Examination or Higher Secondary

School Certificate Examination from the Board of Secondary Education, Bhopal, or its equivalent and must have offered higher or full Mathematics in Physics or Chemistry securing at least 40% marks in the subject.

Candidates must be between 15 and 21 years of age. Upper age is relaxable upto 3 years for students of Scheduled Castes and Scheduled Tribes. Admission to 1st semester is determined by preparing a merit list as follows :

Percentage of aggregate marks obtained in the qualifying examination out of 100

For qualifying examination passed in 1st and 2nd division - 5  
For passing higher examination - 5  
For obtaining 60% marks and above in Mathematics - 5

For obtaining 60% and above in drawing or they have passed Intermediate grade Drawing examination - 5

For passing Technical streams course through regular technical institutions - 5

Total 125

Admissions are finalised by the Joint Committee of Principals of Polytechnics when the merit list of various polytechnics is scrutinised and pooled together and candidates are distributed according to their merit and preference.

#### Reservation in Polytechnics

In each Polytechnic 15% of the seats are reserved for Scheduled Castes, 15% for Scheduled Tribes, 3% for children of goldsmiths affected by Gold Control Order. A student need apply to only one Polytechnic giving his preference.

MADRAS

Engineering Colleges (Government and Private)

Admissions to the Engineering Colleges in the State, both Government and private, affiliated to Madras University are made by the Director of Technical Education as one unit. Applications are invited for admission to all the Engineering Colleges by the Director and a Selection Committee consisting of a Chairman and two members nominated by the Government every year including the Principal of one of the private engineering colleges makes the selection of candidates for admission after interviewing each candidate and assessing his suitability for entry into the engineering profession taking into account his aptitude, general ability, interest in sports and other extra-curricular activities including social service, general physical condition and endurance.

Reservation

The State Government has adopted the following procedure for the reservation of seats in Engineering Colleges for admission -

(a) From the total number of seats available, a certain number of seats are reserved for candidates from other States, countries etc.;

(b) The remaining seats are divided into three separate pools (i) general pool (ii) backward classes pool (iii) Scheduled Castes and Tribes Pool and seats are distributed in the proportion of 59%, 25% and 16% respectively.

(c) The seats allotted to the general pool are distributed among the various districts of the State on the basis of population.

#### Polytechnics

The procedure for admission to Polytechnics is different from that followed by Engineering Colleges.

#### Government Polytechnics

Each Polytechnic is taken as a separate unit and a separate Selection Committee consisting of the Principal of the Polytechnic concerned, a member representing the service and a member representing the industry is formed for the unit. A notification inviting applications to all Government Polytechnics in the State is issued by the Directorate of Technical Education. Candidates after filling up the forms are required to send them to the Polytechnics concerned where they seek admission. The interview is conducted by the Selection Committee to assess the suitability of the candidate for entering into the technical profession in this connection. The general aptitude, ability, interest in sports or NCC activity, extra-curricular activities including social service, general physical condition and endurance of the candidate are also taken into account and 75 marks are awarded for these factors. The Committee prepares a tabulated mark list in order of merit in respect of the candidates invited for final selection by the Director of Technical Education.

#### Private Polytechnics

The applications for admission to private

polytechnics are called for by the Polytechnics concerned but the selection is made by a Selection Committee consisting of one member elected by the Governing Council of the Polytechnics concerned - one representative of the State Government nominated by the Director of Technical Education and the Principal of the Polytechnic concerned. The rules relating to admission are the same as for Government polytechnics. No zonal reservation is made in respect of Polytechnics. However, preference is given to candidates of a particular district for admission to the Polytechnic of that District.

#### Reservation

16% of the total number of seats in the Polytechnic are reserved for candidates belonging to Scheduled Castes and Scheduled Tribes. 25% of the total number of seats in the Polytechnic are reserved for socially and educationally backward classes.

#### MAHARASHTRA

#### Engineering Colleges (Government and non-Government)

After taking out the seats reserved for candidates belonging to Scheduled Castes, Scheduled Tribes, Navbudhas and other backward classes and any other seats specially reserved for any other backward class, the remaining open seats available in all the Engineering Colleges, both Government and non-Government, are distributed among the candidates passing from the various universities in the State in the ratio of the number of seats registering for the I.Sc. group or its equivalent examination in the

year. After arriving at the quota of each university on this basis a merit list of the qualified students applying for admission from each university is prepared in the descending order of merit and admissions are offered to the students from the list till the quota of the particular university in the State is filled.

The minimum percentage of marks prescribed for admission is 45 at the qualifying examination. This is not applicable in the case of Scheduled Castes, Scheduled Tribes, Navbudhas and other backward class candidates.

Procedure to prepare the merit list

The merit list is prepared on the following basis. Marks obtained at the qualifying examination are converted to a standard of 600. To these are added 30 marks for passing SSC Examination with the prescribed technical subjects, 30 marks for passing the first year Diploma Examination in 1st Class from institutions in the State, 10 marks for passing the SSC or its equivalent examination with 60% or more marks or Cambridge School Certificate Examination with 'A' Grade, 10 marks for at least one year service in the NCC at the collegiate stage and a maximum of 30 marks for participation in all the accredited inter-collegiate competitions. From these marks are to be subtracted 10 marks for every



failure at the collegiate examination.

The children of the Government employees who are transferred to the State during the year preceding the one in which admissions are affected and who have received education in other States will be treated as on par with the students in the State provided they are otherwise eligible.

#### Reservation

The State Government has made the following reservations for admission to Engineering institutions : Scheduled Castes and Navbudhas - 12%, Scheduled Tribes - 8%, Vimuktajatis and Nomadic Tribes - 4%, Other Backward Classes 6%. The admission against the seats reserved for backward classes is also made on their merit inter se.

#### Polytechnics and other Diploma Courses in

Engineering: The procedure followed is exactly the same as for Engineering Colleges except the changes in the eligibility conditions and the procedure to prepare the Merit List.

MYSORE

Engineering Colleges

The selection for admission to Engineering Colleges under each university is done by a Selection Committee generally consisting of Director of Technical Education, the Principals of the Colleges and the representative of the concerned University. Selections to aided engineering colleges also are made by the same Selection Committee.

Reservations

In reserving seats, candidates belonging to scheduled castes get 15% of the seats, Scheduled tribes 3%, backward classes 30%. The remaining 52% seats are distributed among the candidates on the basis of merit.

The selection is made on the basis of marks obtained in the optional subjects, Physics, Chemistry and Mathematics at the qualifying examinations. 75 marks are also provided for interviews. The merit list is prepared in order of the aggregate marks obtained at the qualifying examinations in optional subjects and interviews.

Other Conditions

If the annual income of parents is Rs. 1200 or less they are regarded as economically backward and those belonging to one of the following types of occupations are also considered as backward; skilled artisans, cultivators, petty

businessmen, Class IV menial servants in Government and other menial workers doing manual work.

#### Non-Government Private Colleges

In the case of colleges which are entirely controlled by private agencies and which do not receive any government grants, admission is based on the marks obtained in the optional subjects in the qualifying examinations, subject to payment of substantial contributions to the development of the institutions by the parents of the candidates.

#### Polytechnics

The procedure for admission to Government Polytechnics is broadly similar to the same as for Engineering Colleges. It is, however, necessary for the candidates to apply to institutions where they seek admission. Separate selection committees for each institution will be constituted by the government. A few seats are reserved by the Government for scholars from outside the State and other countries.  $2\frac{1}{2}\%$  of the total number of seats available are also reserved for children or wards of Defence personnel. 15% of the seats in each of the Polytechnics for diploma courses will be reserved for students passing the X standard with the required technical subjects as optional.

The remaining seats are distributed according to the proportion already mentioned - Scheduled Castes 15%, Scheduled Tribes 3%, socially and economically backward classes 13%, merit pool 52%. The selection committee first prepares a consolidated list of all applicants in order of merit on the basis of marks obtained in optional subjects plus marks at the interview. From this list a second list will be prepared containing the name of applicants equal to the total number of seats to be selected per institute. Candidates who have not secured the minimum qualifying marks will not be called for interview.

#### PUNJAB

##### Engineering Colleges (Govt. and Non-Government)

The admission into Government and non-Government degree institutions is made by the respective institutions purely on merits on the basis of marks obtained by the candidates in University examinations.

##### Reservation

Seats are reserved for Scheduled Castes, Backward Areas, Sportsmen, Himachal Pradesh candidates, Nationals of South-East Asia, Jammu & Kashmir, students from abroad, self-financing student, both Indian and foreign, on the basis of seats allotted categorywise by the Department. For the year 1965-66 the allocation was as below:

	Punjab Engineer- -ing College, Chandigarh	College of Archit- -ecture, Chandi- -garh	Kuru- -kshetra Regional Engg. College	Guru Nanak Engg. College, Ludhiana	Thapar Insti- -tute of Engg., Patiala
Total Seats	360	30	120	180	180
Scheduled Castes & Scheduled Tribes	61	6	24	36	36
Backward Classes	6	1	Nil	2	2
Backward Areas	34	3	Nil	Nil	Nil
Sportsmen	6	1	Nil	Nil	Nil
Himachal Pradesh candidates	5	2	6	Nil	Nil
South-East Asia candidates	4	Nil	Nil	Nil	Nil
Jammu & Kashmir	10	Nil	Nil	Nil	Nil
Refugee Indians from abroad	5	Nil	Nil	Nil	Nil
Self-financing foreign students	1	Nil	Nil	Nil	Nil
Students from rural areas	Nil	Nil	Nil	126	Nil

Polytechnics (Govt. and Non-Government)

The admission in all the Government diploma and technical institutions is also made purely on merit, on the basis of marks obtained by the candidates in university examinations through a common selection board after pooling all the seats of Polytechnics. The candidates are required to indicate their preference in the descending order on the application forms for admission to the Polytechnics, and the

allocation of Polytechnics is made on the basis of preference given by a candidate and his merit position according to university marks.

The candidates who do not get admission in the Polytechnics of their first choice are accommodated in other Polytechnics according to their position and merit and the order of preference shown by the candidates in their admission forms.

The admission to privately managed Polytechnics is made by the management of the institutions.

#### Reservation

All the seats are allocated categorywise as in the case of Engineering Colleges.

#### RAJASTHAN

##### Engineering Colleges - Government & Non-Government:

Admissions are made on the basis of marks obtained in the qualifying examinations. In the case of regional colleges, 50% of the seats are allotted to the candidates who belong to the State and the remaining 50% earmarked for the candidates from other States of India.

##### Polytechnics

Admissions are made on the basis of marks obtained in the high school examination.

Reservation

About 15% of the seats are reserved for students belonging to Scheduled Castes and 5% for students belonging to Scheduled Tribes.

UTTAR PRADESH

Engineering Colleges - Govt. & Non-Government:

The Engineering Colleges in the State are autonomous and being run by either managing bodies of their own or the Universities. Each Engineering College has its own way of admissions and no uniform pattern for admissions has been laid down for them. The Engineering Colleges at Banaras Hindu University, Varanasi, College of Engineering and Technology, Muslim University, Aligarh, Engineering College, Dayalbagh, Agra, M.L. Engineering College, Allahabad, M.M. Engineering College, Gorakhpur, H.B. Technological Institute, Kanpur, Government Central Textile Institute, Kanpur, Government Agriculture Institute, Allahabad and National Sugar Institute, Kanpur admit students strictly on the basis of merit based on the marks obtained at the qualifying examinations whereas the admissions at Indian Institute of Technology, Kanpur and Roorkee University, Roorkee are made through all-India competitive examinations.

Polytechnics - Government and Private

Admissions to 1st year classes of all the Polytechnics are made directly by the Principals

but no candidate who does not fulfil the minimum educational qualification laid down is admitted.

The applications will be invited upto a date not earlier than 15 days subsequent to the announcement of results of the High School/Intermediate Examination by the Board of High School and Intermediate Education, U.P. and admissions finalised as far as possible by the end of July.

Each Institution is required to select the best students out of the applicants, according to merit, subject to their having acquired the prescribed minimum qualifications. The applications received are to be arranged in the following manner.

Category No.	Aggregate of marks in Intermediate with Physics, Chemistry and Mathematics.	Aggregate of marks in High School/Higher Secondary or High School(Technical) or Secondary Technical Certificate course with Science and Mathematics
1	2	3
1.	60.0% or above	33.0% or above.
2.	33.0% or above but below 60.0%	60.0% or above or 55.0% or above for High School(Technical).
3.	66.0% or above in Secondary Technical Certificates (Previously called Junior Technical Certificate).	
4.	Nil	60.0% or above or 55.0% for High School (Tech.) or 61.0% for Secondary Technical Certificate.
5.	45% or above but below 60.0%	33.0% or above.



1	2	3
6.	45.0% or above but below 60.0%	No Science in High School
7.	33.0% or above but below 45.0%	45.0% or above but below 60.0%
8.	45.0% or above but below 61.0% in Secondary Technical Certificate (Previously called Junior Technical Certificate).	
9.	Nil	45.0% or above but below 60.0% (55.0% for High School Technical)
10.	33.0% or above but below 45.0	33.0% or above but below 45.0%
11.	33.0% or above but below 45.0%	No Science in High School
12.	Nil	45.0% (High School without Science and/or Mathematics, who pass in Science and/or Mathematics as additional subject in High School).

Additional categories in respect of Printing Technology and Stenography and Secretarial Practice courses in which cases the requirement of Science and/or Mathematics is not necessary.

13.	33.0% or above	33.0% or above.
14.	Nil	33.0% or above.

1 Selection is to be made as per categories detailed above, i.e. all the students of the first category are to be selected before going on to the next lower category. Amongst one category, the relative merit should be decided on the basis of the marks obtained by them and selection made according to the vacancies available in order of merit thus determined.

2 In the application form, candidates are required to furnish choice of course according to their preference. According to merit each student should be given his first choice but if there be no vacancy in the course opted against first choice he may be considered for his second choice and/or third choice as the case may be.

3. The entire responsibility of the admission of such a candidate who does not fulfil the required minimum qualification is that of the candidate and the Head of the Institute. The Board will not permit any relaxation for admission either to the class or its examination.

Reservation:

Reservation of seats at Government and non-Government Polytechnics in the State is made as follows:-

- |   |   |
|---|---|
| 1. 25% of the intake  | Scheduled Caste Students.                                       |
| 2. 12 seats at Nainital Polytechnic, Nainital and four seats in other Polytechnics.   | Students from Border Areas.                                     |
| 3. 5% of the annual intake  | Sons and wards of Goldsmiths engaged in profession.             |
| 4. One seat of each 60 students admitted  | Sons and wards of political sufferers and fighters for freedom. |
| 5. 3 seats at N.R. School of Printing Technology, Allahabad. 2 seats at Govt. Central Textile Institute, Kanpur and one seat at Government Leather Institute, Kanpur                        | Students from Border Areas.                                     |
| 6. 2 seats at Government Polytechnic, Gorakhpur in Electrical and Mechanical Engineering courses and one seat in Textile Technology course at Government Central Textile Institute, Kanpur. | Students from Jammu and Kashmir State.                          |

7. One seat reserved out of every 60 seats in every Polytechnic (Government as well as Aided). Sons/Daughters wards of military personnel.

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WEST BENGAL

Engineering Colleges - Government & Non-Government

Admissions to Engineering College under the Jadavpur University is made in order of merit on the basis of marks obtained at the qualifying examination in Science subjects and marks awarded at the interview.

Admissions to other Engineering Colleges in the State are made by a Board called the West Bengal Board of Examination for admission to Engineering Degree Colleges. This Board conducts a written examination and selects candidates for admission to the Government Engineering Colleges at Howrah and North Calcutta and Non-Government Engineering Colleges at Jalpaiguri and Durgapur.

There is no system of reservation for any group or community in West Bengal.

Polytechnics and other Engineering Institutions for Diploma Courses

Admission is made on the basis of oral test of candidates who have passed the qualifying examination.

SECTION III

TABLES

SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED TO  
INSTITUTIONS OF PROFESSIONAL TECHNICAL AND  
VOCATIONAL EDUCATION IN 1965.

TABLE No. 1: INDIAN INSTITUTES OF TECHNOLOGY

	Indian Institutes of Technology					All India Total
	Bombay	Delhi	Kanpur	Madras	Kharagpur	
<u>Students from</u>						
Rural	5 (1.6)	9 (3.3)	8 (8.1)	286 (20.3)	20 (4.4)	328 (12.8)
Urban	328 (98.4)	266 (96.7)	91 (91.9)	1,125 (79.7)	436 (95.6)	2,246 (87.2)
Total	333 (100.0)	275	99	1,411	456	2,574 (100.0)
<u>Occupations of Parents</u>						
Professional	33 (9.9)	11 (4.0)	6 (6.1)	107 (7.6)	24 (5.3)	181 (7.2)
Service	201 (60.4)	191 (69.4)	57 (57.6)	847 (60.0)	282 (61.8)	1,578 (61.2)
Business	96 (28.8)	35 (23.6)	20 (20.2)	248 (17.6)	89 (19.5)	518 (20.1)
Agriculture	3 (0.9)	4 (1.5)	2 (2.0)	97 (6.9)	16 (3.5)	122 (4.3)
Others	-	4 (1.5)	14 (14.1)	112 (7.9)	45 (9.9)	175 (7.2)
	333	275	99	1411	456	2,574 (100.0)
<u>Monthly Income of parents</u>						
Rs. 1-150	17 (5.1)	9 (3.3)	4 (4.1)	127 (9.0)	23 (5.0)	180 (6.9)
151-300	35 (10.5)	51 (18.5)	18 (18.2)	202 (14.3)	66 (14.5)	372 (13.8)
301-500	81 (24.3)	65 (23.6)	25 (25.2)	238 (16.9)	101 (22.2)	510 (20.6)
above 500	200 (60.1)	150 (54.6)	52 (52.5)	844 (59.8)	266 (58.3)	1,512 (58.7)
Total	333	275	99	1411	456	2,574 (100.0)

Source: (1) Data supplied by the Institutes.

(2) Figures in parenthesis indicate percentage.

(3) Mostly admissions in first year classes covered.

**Table 2: Zonewise distribution of students in accordance with the Institutes of first choice by students who qualified at Entrance Examination of the I.I.Ts.**

Zone	IIT Bombay	IIT Delhi	IIT Kanpur	IIT Kharagpur	IIT Madras	Total
West Zone	430	10	8	30	5	483
North-Delhi	25	509	40	70	14	658
North-Kanpur	19	52	225	42	-	338
Eastern Zone	10	9	13	415	4	451
Southern Zone	24	6	5	22	146	203
	508	586	291	579	169	2133

**Table No. 1: Analysis of the students who qualified for admission to five I.I.Ts. - 1965**

	Bombay	Delhi	Kanpur	Kharagpur	Madras	Total
No. of applications received.	3909	5961	5966	5756	4127	25,719
No. of students who had taken the examinations.	Not known	5354	5364	4809	3340	22776
No. of students who have qualified.	483	658	338	451	203	2133

Source: (1) Data supplied by the Institutes.  
 (2) Figures in parenthesis indicate percentage.  
 (3) Mostly admissions in first year classes covered.

Table No. 4 : State-wise distribution of students who qualified in the Entrance Examination of the I.I.Ts. - 1965

	<u>SOUTH</u>	<u>NORTH KANPUR</u>	<u>NORTH DELHI</u>	<u>EASTERN KHARAGPUR</u>	<u>WEST BOMBAY</u>	<u>TOTAL</u>
Andhra	26	1	6	3	5	41
Assam	1	-	-	11	-	12
Bihar	-	2	6	52	1	61
Delhi	2	5	39	7	1	405
Foreign	-	-	1	1	-	2
Goa	-	-	2	-	7	9
Gujrat	-	2	-	2	26	30
Himachal Pradesh	-	1	-	-	-	1
Jammu & Kashmir	-	-	3	1	1	5
Kerala	1	1	1	4	9	39
Madras	2	2	27	7	10	148
Maharashtra	4	2	9	1	370	386
Mysore	47	2	9	5	17	80
Madhya Pradesh	-	2	3	1	10	16
Manipur	-	-	-	1	-	1
Nagaland	-	-	-	1	-	1
Orissa	-	-	1	12	-	13
Punjab	2	6	102	11	6	127
Rajasthan	-	28	5	4	5	42
Tripura	-	-	-	2	-	2
Uttar Pradesh	3	279	62	5	6	355
West Bengal	1	5	22	320	9	357
<b>TOTAL</b>	<b>203</b>	<b>338</b>	<b>658</b>	<b>451</b>	<b>483</b>	<b>2133</b>

Source: (1) Data supplied by the Institutes.  
(2) Figures in parenthesis indicate percentage.  
(3) Mostly admissions in first year classes covered.

SOCIO-ECONOMIC CONDITIONS OF STUDENTS ADMITTED  
TO TECHNICAL EDUCATION INSTITUTIONS

TABLE No. 5 REGIONAL ENGINEERING COLLEGES

	<u>REGIONAL ENGINEERING COLLEGE</u>							
	Waran- gal (A.P.)	Sri- nag- ar (J&K)	Surat (Maha- rash- tra)	Nagpur (Mahara- shtra)	Surat- kal (Mysore)	Rour- kela (Ori- ssa)	Durga- pur (WB)	All India (Total)
<u>Students coming from</u>								
Rural	113 (45.4)	57 (29.4)	44 (14.4)	32 (16.7)	154 (61.1)	542 (55.2)	56 (22.5)	998 (41.2)
Urban	136 (54.6)	137 (70.6)	263 (85.6)	160 (83.3)	98 (38.9)	440 (44.8)	193 (77.5)	1,427 (58.8)
Total	249	194	307	192	252	982	249	2,425 (100.0)
<u>Occupation of their parents</u>								
Professional	32 (12.9)	17 (8.8)	44 (14.4)	33 (17.2)	10 (4.0)	130 (13.2)	-	266 (10.9)
Service	77 (30.9)	62 (32.0)	141 (45.9)	51 (26.6)	81 (32.1)	381 (38.8)	112 (45.0)	905 (37.3)
Business	35 (14.1)	65 (33.5)	83 (27.0)	40 (20.8)	45 (17.9)	123 (12.5)	40 (16.1)	431 (17.9)
Agriculture	78 (31.3)	35 (18.0)	38 (12.4)	31 (16.1)	65 (25.8)	325 (33.1)	8 (3.2)	580 (23.9)
Others	27 (10.8)	15 (7.7)	1 (0.3)	37 (19.3)	51 (20.2)	23 (2.4)	89 (35.7)	243 (10.2)
	249	194	307	192	252	982	249	2,425 (100.0)
<u>Income of their parents monthly</u>								
Rs.1-150	103 (41.3)	88 (45.4)	93 (30.3)	61 (31.8)	88 (34.9)	346 (35.2)	20 (8.0)	799 (32.9)
151-300	49 (19.7)	28 (14.4)	112 (36.5)	48 (25.0)	75 (29.8)	241 (24.6)	66 (26.5)	619 (25.6)
301-500	45 (18.1)	34 (17.5)	67 (21.8)	46 (23.9)	40 (15.9)	184 (18.7)	163 (65.5)	579 (23.8)
501 & above	52 (20.9)	44 (22.7)	35 (11.4)	37 (19.3)	49 (19.4)	211 (21.5)	-	428 (17.7)
Total	249	194	307	192	252	982	249	2,425 (100.0)

Source: (1) Data supplied by the Institutes.

(2) Figures in parenthesis indicate percentage.

(3) Mostly admissions in first year classes covered.

SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED TO  
PROFESSIONAL, TECHNICAL AND VOCATIONAL INSTITUTIONS  
IN 1965

TABLE NO.6: Engineering Colleges

State	Students coming from			Total
	Rural areas	Urban areas		
1.	2.	3.	4.	
Assam	(3) 487 (60.2)	322 (39.8)	809	
Andhra Pradesh	(3) 526 (50.6)	513 (49.4)	1039	
Bihar	(3) 604 (64.5)	233 (35.5)	937	
Gujarat	(2) 245 (26.0)	699 (74.0)	944	
Kerala	(4) 1336 (52.0)	1223 (48.0)	2559	
Madhya Pradesh	(4) 158 (17.9)	724 (82.1)	882	
Madras	(6) 603 (34.5)	1147 (65.5)	1750	
Maharashtra	(5) 309 (24.2)	1382 (15.8)	1691	
Mysore	(4) 473 (38.8)	745 (61.2)	1218	
Orissa	(1) 73 (59.8)	49 (40.2)	122	
Rajasthan	(2) 150 (24.5)	461 (75.5)	611	
Uttar Pradesh	(5) 192 (19.7)	784 (80.3)	976	
West Bengal	(5) 788 (27.7)	2058 (72.3)	2846	
Delhi	(1) 8 (3.2)	240 (96.8)	248	
All-India (Total)	(48) 5166 (34.1)	9978 (65.9)	15,144 (100.0)	

Source: Data by the Institutions. Figures in parenthesis indicate percentage. Mostly admissions in first year classes covered.



SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED  
TO PROFESSIONAL, TECHNICAL AND VOCATIONAL  
INSTITUTIONS IN 1965

TABLE NO. 6-Aa: Engineering Colleges

State	Occupations of their parents					
	Profess- ionals	Service	Busi- ness	Agri- cultu- rists	Others	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Andhra Pradesh (3)	25 (2.4)	293 (28.2)	104 (10.6)	458 (44.1)	159 (15.3)	1039
Assam (3)	58 (7.2)	281 (34.7)	134 (16.6)	218 (26.9)	118 (14.6)	809
Bihar (3)	103 (11.0)	221 (23.6)	97 (10.3)	441 (47.6)	75 (7.5)	937
Gujarat (2)	197 (20.9)	92 (9.8)	327 (34.6)	138 (14.6)	190 (20.1)	944
Kerala (4)	414 (16.2)	739 (28.9)	523 (20.4)	752 (29.4)	131 (5.1)	2559
Madhya Pradesh (4)	54 (6.2)	390 (44.3)	227 (25.7)	177 (20.1)	34 (3.8)	882
Madras (6)	182 (10.4)	570 (32.6)	312 (17.8)	395 (22.6)	291 (6.6)	1750
Maharashtra (5)	82 (4.8)	850 (50.3)	428 (25.3)	295 (17.5)	36 (2.1)	1691
Mysore (4)	100 (8.2)	293 (24.1)	229 (18.8)	397 (32.6)	199 (16.3)	1218
Orissa (1)	4 (3.3)	57 (46.7)	9 (7.5)	49 (40.1)	3 (2.4)	122
Rajasthan (2)	18 (2.9)	176 (28.8)	198 (32.4)	77 (12.6)	142 (23.3)	611
Uttar Pradesh (5)	82 (8.4)	435 (44.6)	306 (31.3)	124 (12.7)	29 (3.0)	976
West Bengal (5)	195 (6.8)	1200 (42.2)	522 (18.3)	243 (8.6)	686 (24.1)	2846
Delhi (1)	22 (8.9)	165 (66.5)	49 (19.8)	12 (4.8)	-	248
All India (Total)	(48) 1320 (8.7)	5242 (34.6)	3218 (21.2)	3392 (22.4)	1972 (13.1)	15144 (100.0)

Source: Data by the Institutions. Figures in parenthesis indicate percentage. - Mostly admissions in first year

SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED TO  
PROFESSIONAL TECHNICAL & VOCATIONAL INSTITUTIONS  
IN 1965

TABLE No. 6 : Engineering Colleges

		Income of their parents (monthly)				Total
		Rs. 1-150	151-300	301-500	above 500	
1		2	3	4	5	6
Assam	(3)	400 (49.5)	310 (38.3)	69 (8.5)	30 (3.7)	809
Andhra Pradesh.	(3)	685 (65.9)	190 (18.3)	107 (10.3)	57 (5.5)	1039
Bihar	(3)	526 (56.2)	270 (28.8)	95 (10.1)	46 (4.9)	937
Gujarat	(2)	333 (35.3)	250 (26.5)	361 (38.2)	-	944
Kerala	(4)	1081 (42.2)	802 (31.4)	465 (18.2)	211 (8.2)	2559
Madhya Pradesh	(4)	313 (35.5)	314 (35.6)	185 (20.9)	70 (8.0)	882
Madras	(6)	677 (38.7)	411 (23.5)	389 (22.2)	273 (15.6)	1750
Maharashtra	(5)	558 (33.0)	480 (28.4)	349 (20.6)	304 (18.0)	1691
Mysore	(4)	615 (50.5)	280 (23.0)	193 (15.9)	130 (10.6)	1218
Orissa	(1)	73 (59.9)	21 (17.2)	10 (13.1)	12 (9.8)	122
Rajasthan	(2)	164 (26.8)	183 (30.0)	119 (19.5)	145 (23.7)	611
Uttar Pradesh	(5)	228 (23.4)	324 (33.2)	206 (21.1)	218 (22.3)	976
West Bengal	(5)	791 (27.8)	1008 (35.4)	370 (20.0)	477 (16.8)	2846
Delhi	(1)	29 (11.7)	64 (25.8)	82 (33.1)	73 (29.4)	248
All-India (Total)	(48)	5865 (38.7)	4425 (29.1)	2968 (19.6)	1886 (12.6)	15144 (100.0)

Source: Data by the Institutions.  
Figures in parenthesis indicate percentage.  
Mostly admissions in first year classes covered.

SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED TO  
PROFESSIONAL, TECHNICAL AND VOCATIONAL INSTITUTIONS  
IN 1965

TABLE No.7 Medical (including Nursing, Dentistry,  
Pharmacy of Ayurvedic Institutions.

State		Students coming from		
		Rural	Urban Area	Total
1		2	3	4
Andhra Pradesh	(2)	196 (59.2)	135 (40.8)	331
Gujarat	(4)	269 (55.6)	215 (44.4)	484
Madhya Pradesh	(4)	103 (35.6)	186 (64.4)	289
Madras	(2)	53 (33.8)	104 (66.2)	157
Maharashtra	(11)	428 (17.6)	2011 (82.4)	2439
Mysore	(3)	88 (26.1)	249 (73.9)	337
Orissa	(1)	162 (82.2)	35 (17.7)	197
Punjab	(3)	141 (45.1)	172 (54.9)	313
Rajasthan	(2)	43 (19.1)	183 (80.9)	226
Uttar Pradesh	(4)	208 (56.1)	163 (43.9)	371
West Bengal	(8)	256 (30.1)	594 (69.9)	850
Delhi	(1)	--	124 (100.0)	124
All India Total	(45)	1947 (31.8)	4171 (68.2)	6118 (100.0)

Source: Data by the Institutions.  
 Figures in parenthesis indicate percentage.  
 Mostly admissions in first year classes covered.

SOCIO-ECONOMIC BACKGROUND OF STUDENTS  
ADMITTED TO PROFESSIONAL, TECHNICAL &  
VOCATIONAL INSTITUTIONS IN 1965

Table No. ~~Y-A~~ : MEDICAL (including Nursing,  
 Dentistry, Pharmacy of  
 Ayurvedic) Institutions.

State	Occupations of their parents					Total
	Professionals	Service	Business	Agri-culture	Others	
Andhra Pradesh (2)	50 (15.1)	134 (40.5)	44 (13.3)	86 (26.0)	17 (5.1)	331
Gujarat (4)	60 (12.4)	106 (21.9)	44 (9.1)	172 (35.5)	102 (21.1)	484
Madhya Pradesh (4)	88 (30.4)	82 (28.4)	52 (18.0)	52 (18.0)	15 (5.2)	289
Madras (2)	19 (12.1)	50 (31.8)	24 (15.3)	37 (23.6)	27 (17.2)	157
Maharashtra (11)	309 (12.7)	896 (36.7)	586 (24.0)	471 (19.3)	177 (7.3)	2439
Mysore (3)	52 (15.4)	105 (31.2)	45 (13.4)	113 (33.5)	22 (6.5)	337
Orissa (1)	--	36 (18.3)	12 (6.1)	93 (47.2)	56 (28.4)	197
Punjab (3)	113 (36.1)	58 (18.6)	59 (18.8)	42 (13.4)	41 (13.1)	313
Rajasthan (2)	30 (13.3)	102 (45.1)	38 (16.8)	29 (12.8)	27 (12.0)	226
Uttar Pradesh (4)	56 (15.1)	109 (29.4)	63 (17.0)	129 (34.8)	14 (3.7)	371
West Bengal (8)	255 (30.0)	271 (31.9)	101 (11.9)	80 (9.4)	143 (16.8)	850
Delhi (1)	16 (12.9)	66 (53.2)	23 (18.6)	5 (4.0)	14 (11.3)	124
All India (Total) (45)	1048 (17.1)	2015 (32.9)	1091 (17.9)	1309 (21.4)	655 (10.7)	6118 (100.0)

Source: Data by the Institutions.  
 Figures in parenthesis indicate percentage.  
 Mostly admissions in first year classes covered.

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SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED TO  
PROFESSIONAL, TECHNICAL & VOCATIONAL INSTITUTIONS  
IN 1965

TABLE NO. 23 . MEDICAL (including Nursing, Dentistry,  
Pharmacy & Ayurvedic) Institutions

State		Income of their parents monthly				Total
		Rs. 1-150	151-300	301-500	Above 500	
Andhra Pradesh	(2)	177 (53.5)	61 (18.4)	38 (11.5)	55 (16.6)	331
Gujarat	(4)	281 (53.1)	127 (26.2)	40 (8.3)	36 (7.4)	484
Madhya Pradesh	(4)	66 (22.8)	105 (36.3)	90 (31.2)	28 (9.7)	289
Madras	(2)	54 (34.4)	46 (29.3)	24 (15.3)	33 (21.0)	157
Maharashtra	(11)	549 (22.5)	489 (24.0)	588 (24.1)	813 (33.4)	2439
Mysore	(3)	137 (40.7)	43 (12.8)	77 (22.8)	80 (23.7)	337
Orissa	(1)	5 (2.5)	27 (13.7)	21 (10.7)	144 (73.1)	197
Punjab	(3)	143 (45.7)	110 (35.1)	35 (11.2)	25 (8.0)	313
Rajasthan	(2)	69 (30.5)	59 (26.1)	41 (18.2)	57 (25.2)	226
Uttar Pradesh	(4)	189 (50.9)	89 (24.0)	59 (15.9)	34 (9.2)	371
West Bengal	(8)	204 (24.0)	272 (32.0)	172 (20.2)	202 (23.8)	850
Delhi	(1)	8 (6.4)	10 (8.1)	15 (12.1)	91 (73.4)	124
All India (Total)	(45)	1882 (30.8)	1438 (23.5)	1200 (19.6)	1598 (26.1)	6118 (100.0)

Source: Data by the Institutions

Figures in parenthesis indicate percentage.  
Mostly admissions in first year classes covered.

TABLE NO: 8 SUMMARY STATEMENT OF ADMISSION PROCEDURE TO  
MEDICAL COLLEGES (1963-64)

<u>Name of the State</u>	<u>No. of seats available</u>	<u>No. of seats reserved</u>	
Andhra Pradesh	1,052	Scheduled Castes/ Scheduled Tribes.	16%
		Other Backward Classes.	25%
		Women	30%
		Government of India nominees.	9
			<u>756</u> e.&.e.
Assam	110	-	
Bihar	475	Scheduled Castes	12%
		Scheduled Tribes	10%
		Other Backward Classes	15%
		Women	30%
		Government of India nominees	4
		J.&K.	4
			<u>326</u>
Gujarat	410	Scheduled Castes, Scheduled Tribes & other Backward Classes	15%
		Government of India nominees	4
		Donors' nominess	12
			<u>78</u>
Jammu & Kashmir	112	-	
Kerala	440	Scheduled Castes and Backward Classes	40%
		Cultural Scholar- ship	10%
		Government of India nominess	15
		Other States	11
			<u>246</u>
Madhya Pradesh	660	Scheduled Castes	15%
		Scheduled Tribes	15%
		Women	15%
		Political Sufferers	3%
		Govt. of India nominees	3
			<u>320</u>
Madras	780	Donors' of Churches/ missions:	35
		Scheduled Castes & Tribes:	200
		Backward Classes:	153
		Displaced Persons:	2
		Union Territories :	1
		From Malaya:	2
		Indians from Ceylon :	1
		Indians from Overseas:	4
			<u>398</u>

<u>Name of the State</u>	<u>No. of seats available</u>	<u>No. of seats reserved</u>	
Maharashtra	1,250	Scheduled Castes/ Tribes	18%
		Govt. of India nominees	12%
		Nominees of Trustees	4
			241
Mysore	795	Scheduled Tribes	18%
		Backward Classes	50%
			541
Orissa	450	Scheduled Castes/ Tribes/Backward Classes	20%
		Women	110
			200
Punjab	292	Scheduled Castes	19%
		Other Backward Classes	2%
		Backward area	10%
		Sportmen	2%
		Govt. of India nominees	18%
			3
		except for Ludhiana Municipal Committee where 25% for other States.	
			152
Rajasthan	330	Scheduled Castes	8+
		Children of Political sufferers	2
		Women	20%
			74
Uttar Pradesh	680	Scheduled Castes	8
		Women	30
		Hill areas	13
		Border Area	1
		Govt. of India	11
		J&K	3
			66
West Bengal	516	No reservation except 2 for Tribal Caste	
		Govt. of India nominees	8
			10
Delhi	290	Scheduled Castes	20%
		J&K, Manipur & Tripura	1 each
		Himachal Pradesh	7
			68
Pondicherry	50	Scheduled Castes	10%
			5
<b>Total</b>	<b>9065*</b>		<b>3,481</b> <b>(39.4%)</b>

Source: Directory of Higher Institutions of Learning  
Ministry of Education.....1963

\*Information about 237 seats not available.

SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED TO PROFESSIONAL  
TECHNICAL AND VOCATIONAL INSTITUTIONS IN 1965

TABLE No. 9 AGRICULTURAL COLLEGES

	Assam (1)	Bihar (1)	Gujarat (1)	Maharash- tra (2)	M.P. (2)	Madras (1)	Rajas- than (1)	U.P. (2)	All India Total* (11)
<u>Students coming from</u>									
Urban	51 (53.1)	34 (34.0)	254 (35.4)	303 (57.8)	102 (49.7)	96 (59.3)	205 (35.4)	110 (25.6)	1155 (41.0)
Rural	45 (46.9)	66 (66.0)	463 (64.6)	221 (42.2)	103 (50.3)	66 (40.7)	375 (64.6)	324 (74.6)	1663 (59.0)
TOTAL	96	100	717	524	205	162	580	434	2818 (100.0)
<u>Occupations of their parents</u>									
Professional	8 (8.4)	6 (6.0)	-	26 (5.0)	28 (13.6)	16 (9.9)	20 (3.5)	35 (8.0)	139 (4.9)
Service	60 (63.2)	10 (10.0)	112 (15.6)	56 (10.7)	47 (22.9)	35 (21.6)	340 (58.6)	108 (24.9)	768 (27.4)
Business	10 (10.5)	2 (2.0)	50 (7.0)	27 (5.1)	11 (5.4)	9 (5.5)	50 (8.6)	39 (9.0)	198 (7.0)
Agriculture	15 (15.8)	76 (76.0)	534 (74.5)	401 (76.5)	118 (57.6)	84 (51.9)	170 (29.3)	246 (56.7)	1644 (58.3)
Others	3 (3.1)	6 (6.0)	21 (2.9)	14 (2.7)	1 (0.5)	18 (11.1)	-	6 (1.4)	69 (2.4)
TOTAL	95	100	717	524	205	162	580	434	2818 (100.0)
<u>Income of their parents monthly</u>									
101-150	16 (16.7)	71 (71.0)	433 (61.0)	375 (71.6)	142 (69.3)	123 (75.9)	320 (55.2)	168 (38.7)	1653 (58.7)
151-300	49 (51.0)	23 (23.0)	186 (8.3)	89 (17.0)	52 (25.4)	23 (14.2)	200 (34.5)	133 (30.7)	755 (26.8)
301-500	31 (32.3)	5 (5.0)	60 (8.3)	32 (6.1)	7 (3.4)	16 (9.9)	40 (6.9)	112 (25.8)	303 (10.7)
Above 500	-	1 (1.00)	33 (4.6)	28 (5.3)	4 (1.9)	-	20 (3.4)	21 (4.8)	107 (3.8)
TOTAL	96	100	717	524	205	162	580	434	2818 (100)

\*Figures given by (1) Seven institutions relate to Ist year classes for the year 1965-66.  
(2) Four institutions relate to all classes for the year 1965-66.

Source: (1) Data supplied by the Institutes.  
(2) Figures in parenthesis indicate percentage.  
(3) Mostly admissions in first year classes covered.



SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED TO  
PROFESSIONAL, TECHNICAL AND VOCATIONAL INSTITUTIONS  
IN 1965

TABLE 10      POLYTECHNICS

States		Students coming from		Total
		Rural	Urban	
1. Andhra Pradesh	(22)	2719 (45.8)	3220 (54.2)	5939
2. Bihar	(5)	924 (46.8)	1049 (53.2)	1973
3. Gujarat	(10)	566 (21.6)	2052 (78.4)	2618
4. Kerala	(13)	3924 (81.2)	1806 (18.8)	4830
5. Madhya Pradesh	(16)	1221 (41.5)	1724 (58.5)	2945
6. Madras	(19)	1795 (47.5)	1973 (52.5)	3758
7. Maharashtra	(14)	979 (26.5)	2720 (73.5)	3698
8. Mysore	(16)	1749 (52.5)	1584 (47.5)	3333
9. Orissa	(3)	926 (72.7)	348 (27.3)	1274
10. Punjab	(13)	2383 (44.8)	2934 (55.2)	5317
11. Rajasthan	(6)	496 (32.4)	1034 (67.6)	1530
12. Uttar Pradesh	(19)	2038 (41.7)	2846 (58.3)	4884
13. West Bengal	(10)	2237 (44.3)	2812 (55.7)	5049
14. Delhi	(1)	-	173 (100.0)	173
15. Goa	(1)	74 (39.4)	114 (60.6)	188
16. Manipur	(1)	69 (63.3)	40 (36.7)	109
17. Pondicherry	(1)	85 (30.2)	197 (69.8)	282
All India	(172)	21,274 (44.4)	26,626 (55.6)	47,900 (100.0)

Source: (1) Data supplied by the Institutes.  
(2) Figures in parenthesis indicate percentage.  
(3) Mostly admissions in first year/classes covered.

SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED TO PROFESSIONAL  
TECHNICAL AND VOCATIONAL INSTITUTIONS IN 1965.

Table No. 10 - POLYTECHNICS

State		Occupation of Parents					Total
		Profess- ional	Service	Business	Agriculture	Others	
1. Andhra Pradesh	(22)	376 (6.3)	1705 (28.7)	692 (11.7)	2053 (34.6)	1113 (18.7)	5939
2. Bihar	(5)	235 (11.9)	649 (32.9)	149 (7.5)	767 (38.9)	173 (8.8)	1973
3. Gujarat	(10)	183 (7.0)	915 (35.0)	668 (25.5)	500 (19.1)	352 (13.4)	2618
4. Kerala	(13)	447 (9.3)	910 (18.8)	907 (18.8)	1871 (38.7)	695 (14.4)	4830
5. Madhya Pradesh	(19)	142 (4.8)	1087 (36.9)	703 (23.9)	845 (28.7)	168 (5.7)	2945
6. Madras	(19)	498 (13.0)	919 (24.4)	512 (13.6)	1111 (29.6)	728 (19.4)	3758
7. Maharashtra	(14)	469 (11.0)	1149 (31.1)	892 (24.1)	594 (16.1)	655 (17.7)	3698
8. Mysore	(16)	303 (9.1)	740 (22.1)	501 (15.1)	1216 (36.5)	573 (17.2)	3333
9. Orissa	(3)	0 (0.6)	559 (43.9)	72 (5.6)	633 (49.7)	2 (0.2)	1274
10. Punjab	(13)	305 (5.7)	1441 (27.1)	1595 (30.0)	1295 (24.4)	681 (12.8)	5317
11. Rajasthan	(6)	60 (3.9)	623 (40.7)	370 (24.2)	303 (19.8)	174 (11.4)	1530
12. Uttar Pradesh	(19)	329 (6.7)	1455 (29.8)	1217 (24.9)	1536 (31.5)	347 (7.1)	4884
13. West Bengal	(10)	368 (7.3)	2903 (57.5)	620 (12.3)	865 (17.1)	293 (5.8)	5049
14. Delhi	(1)	-	84 (48.6)	80 (46.2)	1 (0.6)	8 (4.6)	173
15. Goa	(1)	30 (16.0)	45 (23.9)	87 (46.3)	4 (2.1)	22 (11.7)	188
16. Manipur	(1)	1 (0.9)	17 (15.6)	16 (14.7)	33 (30.3)	42 (38.5)	109
17. Pondicherry	(1)	3 (1.1)	106 (37.6)	61 (21.6)	70 (24.8)	42 (14.9)	282
All-India	(172)	3,686 (7.7)	15,307 (32.0)	9,142 (19.1)	13,697 (28.6)	6,068 (12.6)	47,900 (100.0)

Source: Data supplied by the Institutes. Figures in parenthesis indicate percentage. Mostly admissions in first year classes covered.

53 :-  
SOCIO-ECONOMIC BACKGROUND OF STUDENTS ADMITTED TO  
PROFESSIONAL TECHNICAL AND VOCATIONAL INSTITUTIONS

IN 1964

10 (B) Polytechnics

States	Income of Parents (p.m)				Total
	Rs.1-150	Rs.151-300	Rs.301-500	Above 500	
1. Andhra Pradesh (22)	3946 (66.4)	1133 (19.1)	480 (8.1)	380 (6.4)	5939
2. Bihar (5)	852 (43.2)	560 (28.4)	200 (10.1)	361 (18.3)	1973
3. Gujarat (10)	1139 (43.5)	843 (32.2)	456 (17.4)	180 (6.9)	2618
4. Kerala (13)	3215 (66.6)	1074 (22.2)	378 (7.8)	163 (3.4)	4830
5. Madhya Pradesh (18)	1653 (56.1)	714 (24.2)	402 (13.7)	176 (6.0)	2945
6. Madras (19)	2551 (67.9)	811 (21.6)	310 (8.2)	86 (2.3)	3758
7. Maharashtra (14)	1539 (41.6)	941 (25.5)	771 (20.8)	447 (12.1)	3698
8. Mysore (16)	2554 (76.6)	532 (16.0)	198 (5.9)	49 (1.5)	3333
9. Orissa (3)	300	293	78	603	1274
10. Punjab (13)	3603 (67.8)	1170 (22.0)	436 (8.2)	108 (2.0)	5317
11. Rajasthan (6)	831 (54.3)	478 (31.2)	159 (10.4)	62 (4.1)	1530
12. Uttar Pradesh (19)	2752	1450	529	153	4884
13. West Bengal (10)	1427 (28.3)	1980 (39.2)	1121 (22.2)	521 (10.3)	5049
14. Delhi (1)	30 (17.4)	62 (35.8)	81 (46.8)	-	173
15. Goa (1)	47 (25.0)	59 (31.4)	44 (23.4)	38 (20.2)	188
16. Manipur (1)	100	9	-	-	109
17. Pondicherry (1)	175 (62.1)	74 (26.2)	29 (10.3)	4 (1.4)	282
All-India (172)	26,714 (55.8)	12,183 (25.4)	5,672 (11.8)	3,331 (7.0)	47,900 (100.0)

Source (1) Data supplied by the Institutes.

(2) Figures in parenthesis indicate percentage.

(3) Mostly admissions in first year classes covered.

SOCIO ECONOMIC CONDITIONS OF STUDENTS ADMITTED  
TO TECHNICAL EDUCATION INSTITUTIONS IN 1966

TABLE NO. II: Industrial Training Institutes

	Andhra (3)	Bihar (3)	Orissa (1)	Punjab (19)	Uttar Pradesh (2)	All-India Total (28)
<u>Students coming from</u>						
Rural	679 (72.3)	508 (51.8)	93 (67.3)	3018 (58.8)	54 (25.7)	4352 (58.8)
Urban Areas	260 (27.7)	473 (48.2)	45 (32.6)	2113 (41.2)	156 (74.3)	3047 (41.2)
Total	939	981	138	5131	210	7399 (100)
<u>Occupations of their parents</u>						
Professional	106 (11.3)	-	20 (14.5)	183 (3.6)	-	309 (4.2)
Service	188 (20.0)	158 (16.1)	35 (25.4)	920 (17.9)	79 (37.6)	1380 (18.6)
Business	67 (7.1)	111 (11.3)	14 (10.1)	698 (13.6)	33 (15.7)	923 (12.5)
Agriculture	284 (30.3)	689 (70.2)	60 (43.5)	2130 (41.5)	27 (12.9)	3190 (43.1)
Others	294 (31.3)	23 (2.3)	9 (6.5)	1200 (24.4)	71 (33.8)	1597 (21.6)
Total	939	981	138	5131	210	7399 (100.0)
<u>Income of their Parents monthly</u>						
Rs. 1-150	561 (59.8)	922 (94.0)	113 (81.9)	4372 (85.2)	173 (82.4)	6141 (83.0)
151-300	356 (37.9)	53 (5.4)	25 (18.1)	671 (13.1)	28 (13.3)	1133 (15.3)
301-500	19 (2.0)	2 (0.2)	-	84 (1.6)	9 (4.3)	114 (1.5)
Above 500	3 (0.3)	4 (0.4)	-	4 (0.1)	-	11 (0.2)
Total (28)*	939	981	138	5131	210	7399 (100.0)

\*Figures given (1) Seventeen Institutions relate to 1st year in the year 1965-66  
(2) Ten institutions relate to all classes/1965-66.  
(3) One institution relate to all classes in earlier years.

Source: (1) Data supplied by the Institutes.  
(2) Figures in parenthesis indicate percentage.  
(3) Mostly admissions in first year classes covered.

SOCIO-ECONOMIC CONDITIONS OF STUDENTS  
ADMITTED TO TECHNICAL EDUCATION INSTITUTIONS  
IN 1965

TABLE No. 12 : OTHER TECHNICAL INSTITUTIONS

State		Students coming from		Total
		Rural areas	Urban areas	
1. Andhra Pradesh	(1)	19 (30.2)	44 (69.8)	63
2. Kerala	(1)	67 (58.8)	47 (41.2)	114
3. Madhya Pradesh	(1)	50 (79.4)	13 (20.6)	63
4. Madras	(3)	63 (50.4)	62 (49.6)	125
5. Maharashtra	(4)	102 (20.7)	392 (79.3)	494
6. Punjab	(4)	108 (36.1)	191 (63.9)	299
7. Rajasthan	(1)	46 (20.6)	177 (79.4)	223
8. Uttar Pradesh	(6)	147 (28.5)	369 (71.5)	516
9. West Bengal	(4)	349 (32.2)	734 (67.8)	1083
ALL-INDIA TOTAL	(25)	951 (31.9)	2029 (68.1)	2980

Source: (1) Data supplied by the Institutes.

(2) Figures in parenthesis indicate percentage.

(3) Mostly admissions in first year classes covered.

~~Table No. 12(A)~~  
SOCIO-ECONOMIC BACKGROUND OF STUDENTS  
ADMITTED TO TECHNICAL EDUCATION  
INSTITUTIONS IN 1965

Table No. 12(A) - OTHER TECHNICAL INSTITUTIONS

State	Occupations of their parents					Total
	Pro- fess- ional	Ser- vice	Busi- ness	Agri- cul- ture	Others	
1. Andhra Pradesh (1)	15 (23.8)	14 (22.2)	5 (7.9)	20 (31.8)	9 (14.3)	63
2. Kerala (1)	-	35 (33.7)	25 (21.9)	38 (33.4)	16 (14.0)	114
3. Madhya Pradesh (1)	4 (6.3)	6 (9.5)	2 (3.2)	49 (77.8)	2 (3.2)	63
4. Madras (3)	19 (15.2)	41 (32.8)	21 (16.8)	16 (12.8)	28 (22.4)	125
5. Maharashtra (4)	7 (1.4)	98 (19.8)	156 (31.6)	85 (17.2)	148 (30.0)	494
6. Punjab (4)	30 (10.0)	127 (42.5)	59 (19.7)	67 (22.4)	16 (5.4)	299
7. Rajasthan (1)	96 (43.0)	51 (22.9)	56 (25.1)	20 (9.0)	-	223
8. Uttar Pradesh (6)	67 (13.0)	228 (44.2)	83 (16.1)	122 (23.6)	16 (3.1)	516
9. West Bengal (4)	100 (9.2)	547 (50.5)	262 (24.2)	61 (5.6)	113 (10.5)	1083
ALL-INDIA TOTAL	338 (11.3)	1147 (38.6)	669 (22.4)	478 (16.4)	348 (11.7)	2980 (100.0)

Source: (1) Data supplied by the Institutes.

(2) Figures in parenthesis indicate percentage.

(3) Mostly admissions in first year classes covered.

SOCIO-ECONOMIC BACKGROUND OF STUDENTS  
ADMITTED TO TECHNICAL EDUCATION INSTITUTIONS  
IN 1965

Table No. 1 (B) : OTHER TECHNICAL INSTITUTIONS

State	Income of their parents monthly				
	Rs. 1-150	151-300	301-500	Above 500	Total
1. Andhra Pradesh (1)	57 (90.5)	2 (3.2)	3 (4.7)	1 (1.6)	63
2. Kerala (1)	79 (69.3)	24 (21.1)	11 (9.6)	-	114
3. Madhya Pradesh (1)	51 (80.9)	10 (15.9)	2 (3.2)	-	63
4. Madras (3)	72 (57.5)	27 (21.6)	11 (8.9)	15 (12.0)	125
5. Maharashtra (4)	128 (25.9)	146 (29.6)	55 (11.1)	165 (33.4)	494
6. Punjab (4)	133 (44.5)	102 (34.1)	48 (16.1)	16 (5.3)	299
7. Rajasthan (1)	8 (3.6)	51 (22.9)	83 (37.2)	81 (36.3)	223
8. Uttar Pradesh (6)	222 (43.0)	189 (36.6)	70 (13.6)	35 (6.8)	516
9. West Bengal (4)	82 (7.6)	574 (53.0)	337 (31.1)	90 (8.3)	1083
ALL-INDIA TOTAL	832 (27.8)	1125 (37.7)	620 (20.8)	403 (13.6)	2980 (100.0)

Source: (1) Data supplied by the Institutes.

(2) Figures in parenthesis indicate percentage.

(3) Mostly admissions in first year classes covered.

Summary Table No. 1. Socio-economic conditions of students admitted to the Vocational, Technical and Professional Institutions in 1965-66.

(Percentages)

	Indian Insti- tutes of Tech- nology	Region- al En- gineer- ing Col- leges.	Engi- neer- ing Col- leges	Medi- cal Col- leges	Agri- cultural Colle- ges	Poly- tech- nics	Indus- trial Instts.	Other Tech. Instts	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
I. No. of Insti- tutions covered by the study.	5	7	48	45	11	172	28	25	341
Rural areas	328 (12.8)	998 (41.2)	5,166 (34.1)	1,947 (31.8)	1,663 (59.0)	21,274 (44.4)	4,352 (58.8)	951 (31.7)	36,679 (42.0)
Urban areas	2,246 (87.2)	1,427 (58.8)	9,978 (65.9)	4,171 (68.2)	1,155 (41.0)	26,626 (55.6)	3,047 (41.2)	2,029 (68.3)	50,679 (58.0)
Total	2,574 (100.0)	2,425 (100.0)	15,144 (100.0)	6,118 (100.0)	2,818 (100.0)	47,900 (100.0)	7,399 (100.0)	2,980 (100.0)	87,358 (100.0)
II. Occupation of Parents:									
Profes- sionals	181 (7.0)	266 (10.9)	1,320 (8.7)	1,048 (17.1)	139 (4.9)	3,686 (7.7)	309 (4.2)	338 (11.3)	7,282 (8.3)
Service	1,578 (61.3)	905 (37.3)	5,242 (34.6)	2,015 (32.9)	768 (27.4)	15,307 (32.0)	1,380 (18.6)	1,147 (38.6)	28,342 (32.5)
Business	518 (20.1)	431 (17.7)	3,218 (21.2)	1,091 (17.9)	198 (7.0)	9,142 (19.1)	923 (12.5)	669 (22.4)	16,190 (18.5)
Agriculture	122 (4.7)	580 (23.9)	3,392 (22.4)	1,309 (21.4)	1,644 (58.3)	13,697 (28.6)	3,190 (43.1)	478 (16.0)	24,412 (27.9)
Others	175 (6.9)	243 (10.2)	1,972 (13.1)	655 (10.7)	69 (2.4)	6,068 (12.6)	1,597 (21.6)	348 (11.7)	11,127 (12.8)
Total	2,574 (100.0)	2,425 (100.0)	15,144 (100.0)	6,118 (100.0)	2,818 (100.0)	47,900 (100.0)	7,399 (100.0)	2,980 (100.0)	87,358 (100.0)

Source: (1) Data supplied by the Institutes. Contd:-

(2) Figures in parenthesis indicate percentage.

(3) Mostly admissions in first year classes covered.



	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<b>III. Income of Parents</b>										
Less than 150/- P.M.	180 (6.9)	799 (32.9)	5,865 (38.7)	1,882 (30.8)	1,653 (58.7)	26,714 (55.8)	6,141 (83.0)	832 (27.9)	44,066 (50.5)	
Between Rs. 151-300 P.M.	372 (13.8)	619 (25.6)	4,425 (29.1)	1,438 (23.5)	755 (26.8)	12,183 (25.4)	1,133 (15.3)	1,125 (37.7)	22,050 (25.2)	
Between Rs. 301-500 P.M.	510 (20.6)	579 (23.8)	2,968 (19.6)	1,200 (19.6)	303 (10.7)	5,672 (11.8)	114 (1.5)	620 (20.8)	11,966 (13.7)	
Above Rs. 500 P.M.	1,512 (58.7)	428 (17.7)	1,886 (12.6)	1,598 (26.1)	107 (3.8)	3,331 (7.0)	11 (0.2)	403 (13.6)	9,276 (10.6)	
<b>Total</b>	<b>2,574</b> <b>(100.0)</b>	<b>2,425</b> <b>(100.0)</b>	<b>15,144</b> <b>(100.0)</b>	<b>6,118</b> <b>(100.0)</b>	<b>2,818</b> <b>(100.0)</b>	<b>47,900</b> <b>(100.0)</b>	<b>7,399</b> <b>(100.0)</b>	<b>2,980</b> <b>(100.0)</b>	<b>87,358</b> <b>(100.0)</b>	

Source: (1) Data supplied by the Institutes.

(2) Figures in parenthesis indicate percentage.

(3) Mostly admissions in first year classes covered.

(D) Institutions which co-operated in the Study

The Director,  
Indian Institute of  
Technology Bombay,  
Powai, BOMBAY 76.

Shri R.N. Dogra,  
Director,  
Indian Institute of  
Technology Delhi,  
Hauz Khas, New Delhi-16

Dr. P.K. Kelkar,  
Director,  
Indian Institute of  
Technology, KANPUR

The Director,  
Indian Institute of  
Technology,  
Madras,  
I.I.T. P.O., MADRAS 36

The Director,  
Indian Institute of  
Technology,  
P.O. Kharagpur Technology,  
KHARAGPUR S.W. Rly.

The Principal,  
Regional Engineering  
College, WARANGAL,  
P.O. Kazipet (C.Rly.)  
Andhra Pradesh)

Shri B.N. Munchi,  
Principal,  
Regional Engineering  
College,  
Naseem Bagh,  
Srinagar (Jammu & Kashmir)

The Principal,  
Sardar Vallabhbhai  
Regional College  
of Engineering &  
Technology,  
Majura Gate, SURAT-1

Shri V.S. Mokashi,  
Principal,  
Visvesvaraya Regional  
College of Engineering,  
NAGPUR (Maharashtra)

The Principal,  
Sir Venkateswara University,  
College of Engineering,  
TIRUPATI (Andhra Pradesh)

Shri A.S. Adke,  
Principal,  
Karnatak Regional  
Engineering College,  
Suratkal (Mysore)

Deputy Registrar,  
Regional Engineering College,  
Bourkela (Orissa)

Shri C.V. Ramaswamy,  
Proctor,  
Regional Engineering  
College,  
DURGAPUR (W. Bengal)

Shri R. Govinda Menon,  
Principal  
N.S.S. College of  
Engineering,  
Palghat (Kerala)

The Principal,  
University College of  
Engineering,  
Osmania University,  
HYDERABAD 7 (Andhra Pradesh)

Prof. P. N. Damodarani,  
Principal,  
College of Engineering,  
ANANTAPUR-3

The Principal  
Bihar College of Engineering,  
PATNA-5

Shri B. Chaudhary,  
Principal,  
Bhagalpur College of  
Engineering, BHAGALPUR-3

The Principal,  
Dr. S. & S.S. Gandhi  
College of Engineering &  
Technology,  
Majura Gate, SURAT.

Prof. T. M. Parikh,  
Principal,  
L.D. College of Engineering,  
AHMEDABAD 9

The Principal,  
Engineering College,  
TRICHUR (Kerala)

The Principal,  
Thangal Kunju Musaliar  
College of Engineering,  
QUILON-5 (Kerala)

The Principal,  
College of Engineering,  
TRIVANDRUM

Shri N.R. Sitapathi,  
Principal,  
College of Engineering,  
GUINDY, MADRAS 25

The Principal,  
Mar Athanasius College of  
Engineering,  
Kothamangalam College P.O.,  
Kothamangalam T.O.  
(Kerala)

The Principal,  
Government College of  
Engineering & Technology,  
RAIPUR

The Principal,  
Madhav Engineering College,  
GWALIOR-5 (Madhya Pradesh)

The Principal,  
Jawahar Azad College of  
Technology,  
BHOPAL (Madhya Pradesh)

Prof. A.L. Swamy,  
Principal,  
Government Engineering  
College,  
JABALPUR

The Principal,  
Government Engineering  
College,  
BILASPUR (Madhya Pradesh)

The Principal,  
P.S.G. College of Technology,  
Peelamedu, COIMBATORE 4  
(S. India)

The Registrar,  
Annamalai University,  
Annamalainagar P.O.,  
(South India).

Shri A.S. Menon,  
Principal,  
B.V. Bhoomraddi College of  
Engineering & Technology,  
HUBLI

The Director,  
Alagappa Chettiar College  
of Technology Buildings,  
GUINDY, MADRAS-25

The Principal,  
Thiagaraja College of  
Engineering,  
MADURAI-15

The Principal,  
College of Engineering,  
POONA 5

Dr. P.S. Mene,  
Director,  
Laxminarayan Institute of  
Technology, NAGPUR

The Principal,  
College of Engineering,  
AURANGABAD

Shri V.K. Kelkar,  
Principal,  
Walchand College of  
Engineering,  
SANGLI Rly. Stn. Vishrambagh

Shri D.B. Narasimhaiah,  
Principal,  
College of Engineering,  
BANGALORE 1.

Shri E.S. Gurubasappa,  
Principal,  
B.D.T. College of  
Engineering,  
DAVANGERE

Shri K.M. Gangadharaiah,  
Principal,  
Basaveshvar Engineering  
College,  
BAGALKOT (Mysore State)

Shri N.K.N. Murthy,  
Dean,  
Faculty of Engineering &  
Technology,  
Birla Instt. of Tech. &  
Science, PILANI (Rajasthan)

Shri P.S. Kalwachwala,  
Principal,  
Lukhihirji College of  
Engineering, MORVI

The Principal,  
Technical College,  
Dayalbagh, AGRA (U.P.)

Shri G.P. Sinha,  
Principal,  
Technical College,  
Dayalbagh, AGRA

Shri Radhey Shyam,  
Principal,  
Madan Mohan Malviya  
Engineering College,  
GORAKHPUR

The Principal,  
Engineering College,  
DAYALBAGH (Agra)

The Principal,  
College of Mining &  
Metallurgy,  
Banaras Hindu University,  
VARANASI 5

Shri G. Tripathi,  
Principal,  
College of Technology,  
Banaras Hindu University,  
VARANASI 5

Shri S.C. Sen,  
Principal,  
Delhi College of Engineering,  
Kashmere Gate,  
DELHI 6.

The Principal,  
Assam Engineering  
College,  
Gauhati (Assam)

University College of  
Engineering,  
P.O. BURLA (Sambalpur)  
(Orissa)

The Principal,  
H.R.H. The Prince of  
Wales Institute of  
Engineering & Technology,  
Jorhat (Assam)

The Principal,  
B.P.C. Institute of  
Technology,  
Krishnager,  
Nadia (West Bengal)

The Principal  
Jorhat Engineering  
College,  
Jorhat (Assam)

The Secretary,  
Council of the University  
Colleges of Science and  
Technology,  
92, Upper Circular Road,  
Calcutta 9 (West Bengal)

The Principal,  
Bihar Institute of  
Technology,  
Dhanbad (Bihar)

The Principal,  
Hoogly Institute of  
Technology,  
P.O. Hooghly (West Bengal)

The Principal,  
Madras Institute of  
Technology,  
Madras.

The Registrar,  
Jadavpur University,  
Calcutta 32 (West Bengal)

The Principal,  
Cusrow Wadia Institute  
of Technology,  
Poona 1 (Maharashtra)

The Principal,  
Murshidabad Institute  
of Technology,  
Cossimbazar Raj P.O.  
Berhampur (West Bengal)

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IV

MEDICAL

Dr. B.K. Naik,  
Principal,  
Institute of Medical  
Sciences,  
Osmania Medical College,  
HYDERABAD (Andhra Pradesh)

The Principal,  
Shri C.H. Nazar Ayurved  
Mahavidyalaya,  
SURAT 3

Dr. P. Narasimharao,  
Principal,  
Guntur Medical College,  
GUNTUR.

The Principal,  
Shuddha Ayurved  
Mahavidyalaya,  
AHMEDABAD

The Principal,  
Dayabhai Mavaji Majithiya  
Ayurved Mahavidyalaya,  
YEOTMAL

The Principal,  
College of Nursing,  
M.G.M. Medical  
College, INDORE

Shri S.L. Mangi,  
Principal,  
College of Dentistry,  
INDORE.

Shri S.N. Sharma,  
Head, Department of  
Pharmacy,  
University of Saugar,  
Department of Pharmacy,  
SAGAR (Madhya Pradesh)

The Principal,  
Medical College,  
(Jawaharlal Institute of  
Post Graduate Medical  
Education and Research)  
PONDICHERRY 6

Dr. A.N.K. Menon,  
Dean,  
Stanley Medical College,  
MADRAS

Dr. S.N. Shirodkar,  
Principal,  
Miraj Medical College,  
MIRAJ (Maharashtra)

The Principal,  
Shri Rajkumar Singh  
Ayurvedic College,  
INDORE (Madhya Pradesh)

Shri C.S. Krishna Murthi,  
Dean,  
Graduate Wing,  
Armed Forces Medical  
College,  
PONA 1

The Principal,  
R.V. Prasarak Mandal,  
AKOLA (Maharashtra)

The Principal,  
College of Nursing,  
New Nurses Quarters  
J.J. Hospital Compound,  
BOMBAY 8

Shri S.D. Kulkarni,  
Vice-Principal,  
Shuddha Ayurved  
Mahavidyalaya,  
SHOLAPUR (118/19, Shukrawar)

Shri C.B. Puranik,  
Principal,  
Ayurveda Maha Vidyalaya,  
BIJAPUR

Dr. I.B. Bhingare,  
Principal,  
Siddha Nagarjun Ayurveda  
Mahavidyalaya,  
Buiker Road, NAGPUR 2

The Dean,  
Grant Medical College,  
BOMBAY

The Dean,  
Topiwala National Medical  
College, and B.Y.L. Nair  
Charitable Hospital,  
Dr. A.L. Nair Road,  
BOMBAY 8.

The Dean,  
Medical College,  
NAGPUR

Dr. S.V. Joglekar,  
Principal,  
Seth G.S. Medical College,  
Parel, BOMBAY 12.

Acharya,  
Shudh Aurved Mahavidyalaya  
Kajwa Road,  
Baroda (Maharashtra)

Shri N. Lakshminarayan,  
Principal,  
Government College of  
Indian Medicine,  
MYSORE

Dean,  
Medical College,  
BELGUR

Dean,  
Karnatak Medical College,  
HUBLI

The Principal,  
S. C. B. Medical College,  
CUTTACK

The Principal,  
Dayanand Ayurvedic College,  
JULIUNDUR

The Principal,  
Dayanand Medical College,  
LUDHIANA

Head of the Pharmacy  
Department,  
Panjab University,  
CHANDIGARH 3

The Principal,  
Shri Snatan Dharm Ayurved  
Mahavidyalaya,  
BIKANER

The Principal & Controller,  
Sawai Man Singh Medical  
College & Controller of  
attached Hospitals,  
JAI PUR

Prof. P.N. Wahi,  
Principal,  
S.N. Medical College,  
AGRA

Shri C.V.G. Choudary,  
Principal,  
U.P. College of Veterinary  
Science & Animal Husbandry,  
MATHURA

Shri Y.D. Tripathi,  
Principal,  
Lalit Hari Ayurvedic College,  
PILIBHIT (U.P.)

The Principal,  
The National Homeopathic  
Medical College,  
Cantt. Road, LUCKNOW.

Shri Vijayapati Bhattacharya,  
Principal,  
Shyanadas Vaidya Shastra  
Pitha Parisad,  
294/3/1, Acharya Prafulla  
Ch. Road, CALCUTTA 9.

Shri K.C. Sarbadhikari,  
Principal,  
Medical College,  
CALCUTTA

Shri J.C. Sharma,  
Principal,  
The National Homeopathic  
Medical College,  
1, Cantonment Road,  
LUCKNOW

Shri Kaviraj P.K. Sen Gupta,  
Principal,  
J.S. Astanga Ayurveda Vidyalaya  
& the attached Hospitals,  
170-172, Raja Dinendra Street,  
CALCUTTA 4

The Principal,  
Babadwip Ayurved Mahavidyalaya,  
NOIDA

The Secretary,  
Ayurveda Sevak Sangha &  
Vaidyak Pathshala,  
P.O. Contai: Midnapore (W.B.)

Shri Rajagopal,  
All-India Institute of  
Hygiene & Public Health,  
110, Chittaranjan Avenue,  
Calcutta.

The Principal,  
Maulana Azad Medical College,  
NEW DELHI

The Principal,  
Gangadhar Shastri Guna  
Ayurved Mahavidyalaya,  
AHMEDNAGAR

V

AGRICULTURE

The Principal,  
Assam Agricultural College,  
JORHAT

Dr. C. Thakur,  
Principal,  
Tirhut College of  
Agriculture,  
P.O. Dholi (Muzaffarpur)  
BIHAR

Shri R.M. Patel,  
Principal,  
Bansilal Amritlal College  
of Agriculture,  
ANAND (Western Railway)

Dr. S. Solomon,  
Principal,  
College of Agriculture,  
POONA 5

The Principal,  
College of Agriculture,  
NAGPUR

The Principal,  
Jawahar Lal Nehru Krishi  
Vishwa Vidyalaya,  
College of Agriculture,  
REWA (Madhya Pradesh)

The Principal,  
College of Agriculture,  
RAIPUR (Madhya Pradesh)

Dr. K. Ramakrishnan,  
Associate Dean,  
Agricultural College and  
Research Institute,  
COIMBATORE

The Principal,  
College of Agriculture  
(Udaipur University)  
JODHPUR (Rajasthan)

The Principal,  
G.V. College of Agriculture,  
SANGARIA (Rajasthan)

Shri Girendra Singh,  
Principal,  
M.P. Singh Agricultural  
Institute,  
SISAWAR (Mathura)

Shri B.N. Lall,  
Registrar,  
Allahabad Agricultural Institute,  
P.O. Agricultural Institute,  
ALLAHABAD (U.P.)

VI

POLYTECHNIC

The Principal,  
Government Polytechnic,  
GUDUR, Nellore Dt. (A.P.)

Shri E.S. Reddy,  
Principal,  
Government Polytechnic,  
GUDUR Nellore Dist. (A.P.)

Shri P. Veera Raju,  
Principal,  
Government Polytechnic,  
SRIKAKULAM (Andhra Pradesh)

Smt. A. Kamala,  
Principal,  
Government Polytechnic for Girls,  
KAKINADA

Shri P.H.N.B. Sarma,  
Principal,  
Andhra Polytechnic,  
KAKINADA-1

The Principal,  
Annamalai Polytechnic,  
CHETTINAD.



The Principal,  
Girls' Polytechnic,  
HYDERABAD (A.P.)  
(Mukarram Jani Road)

Sri B. Krishnarao,  
Principal,  
Maddi Balatripura Sundaramma,  
Government Polytechnic,  
GUNTUR

Shri P.R. Vittal Rao,  
Principal,  
Government Polytechnic,  
NIZAMBAD (Andhra Pradesh)

The Principal,  
Jawaharlal Nehru Polytechnic,  
Ramanthapur P.O. 13,  
HYDERABAD (Andhra Pradesh)

Shri M. Jesudoss David,  
Principal,  
Government Polytechnic,  
VIJAYAWADA 8  
(Andhra Pradesh)

Shri Syed Moissuddin,  
Principal,  
H.E.H. The Nizam's  
Alladin Tech. Institute,  
HYDERABAD - Dn.

Shri G.R. Kunchur,  
Principal,  
Government Mining Institute,  
KUTHAGUDEM (Andhra Pradesh)

Shri M.J. Siraj Ahmed,  
Principal,  
Government Polytechnic,  
M.H.B.C.B.N.G.R (Andhra Pradesh)

The Principal,  
The Krishnadevarayaga Polytechnic,  
Wanaparthi,  
Mehboob Nagar Dist:  
(Andhra Pradesh)

Shri V.G. Mohan Raj,  
Principal,  
Sree Hullapudi Venkataraya  
Memorial Polytechnic,  
TANUKU, W.G. Dt.  
(Southern Railway)  
(Andhra Pradesh)

Dr. P.B.R. Murthi,  
Principal,  
Government Polytechnic,  
ANANTAPUR (Andhra Pradesh)

Shri V. Prahlad,  
Principal,  
Government Polytechnic,  
VISAKHAPATNAM 7

Shri A.L. Marayan,  
Principal,  
Government Polytechnic,  
HYDERABAD (Andhra Pradesh)

Shri S.R. Gasudrez,  
Principal,  
Government Polytechnic,  
WARANGAL (Andhra Pradesh)

Shri N. Hanumant rao,  
Principal,  
E.S.C. Government Polytechnic,  
NANDYAL, Kurnool District  
(Andhra Pradesh)

Shri V. Tatabbai,  
Principal,  
Government Polytechnic,  
PRODDATUR (Cuddapah Dt.)  
(Andhra Pradesh)

The Principal,  
Government Polytechnic,  
GUDUR, Nellore Dist.(A.P.)

The Principal,  
Government Polytechnic,  
DHANBAD

Shri B.L. Fernandez,  
Supdt. of Training,  
The Jamshedpur Technical  
Institute,  
Tata Iron & Steel Company  
Ltd., JAMSHEDPUR

The Principal,  
Bihar College of Engineering,  
PATNA 5

Shri G.P. Singh,  
Principal,  
Reorganised Mining Classes,  
BHAGA (Dhanbad)

- Shri Tara Chand,  
Registrar,  
Indian School of Mines,  
INDIA
- Shri S.M. Amin,  
Principal,  
P.L. Vishvakaruna  
Mahavidyalaya,  
P.O. Vallabh Vidyanagar  
(G. S. S. S.)  
Dist. Kaira (Gujarat State)
- Shri P.K. Patel,  
Principal,  
K.J. Polytechnic,  
BROACH
- Shri B.A. Seju,  
Principal,  
Kilachand Devchand  
Polytechnic,  
PATAN (N.G.)
- Shri B.S. Subbarao,  
Principal,  
S.V. Parekh Technical  
Institute,  
Government of Gujarat,  
RAJKOT
- The Principal,  
Government Polytechnic,  
AMMEDABAD
- Shri S.B. Kumta,  
Principal,  
Sir Bhavsinhji Polytechnic  
Institute,  
BH.VN.G.R
- Shri H.G. Daryani,  
Principal,  
Gandhidham Polytechnic,  
ADIPUR (Kutch)
- Shri U.C. Dave,  
Principal,  
Government Polytechnic,  
PORBANDAR
- Shri S.S. Patel,  
Principal,  
Bhailalbai & Bhikhabhai  
Polytechnic, Vallabh Vidyanagar,  
Dist: Kaira (Gujarat State)
- The Superintendent,  
Sheth Chinanlal Nagindas  
Polytechnic Institute,  
Anbawadi, Ellis Bridge,  
AMMEDABAD 6
- The Principal,  
Government Polytechnic,  
KALAMASSERY
- The Principal,  
Maharaja's Technological  
Institute,  
TRICHUR 1
- The Principal,  
Kerala Government Polytechnic,  
CALICUT 5
- Shri Achariah George,  
Principal,  
Carmel Polytechnic,  
Alleppey, Punnappra P.O.,  
(Kerala)
- The Principal,  
Women's Polytechnic,  
TRIVANDRUM (Kerala)
- Mrs. Padmavatty,  
Principal,  
Women's Polytechnic,  
TRICHUR
- The Principal,  
Seethi Sanib Memorial  
Polytechnic,  
TRICHUR P.O. (Kerala)
- Shri K.G. Menon,  
Principal,  
Government Polytechnic,  
Nattakon, D.O.,  
KOTTAYAM 13
- Shri E.K. Menon,  
Principal,  
Thiagarajar Polytechnic,  
Alagappanagar P.O.  
(Kerala State)

The Principal,  
Sree Narayana Polytechnic,  
Kottiyam P.O.  
QUILON

Shri N. Mateen,  
Principal,  
Harda Polytechnic,  
DARDA (M.P.)

The Principal,  
Sreerama Polytechnic,  
VALAPAD (Kerala)

Shri H.S. Srikantiah,  
Principal,  
Government Polytechnic,  
DHULLA

Shri N. Bhaskara Kurup,  
Principal,  
N.S.S. Polytechnic,  
Mannanagar P.O.  
PANDLAM

The Principal,  
Government Central Technical  
Institute, (Poly),  
GWALIOR (Madhya Pradesh)

Shri N.R. Das Gupta,  
Principal & Secretary,  
Shri Vaishnav Polytechnic,  
M.C.G. Lines,  
INDORE 2

Shri D.R. Subrahmanyam,  
Principal,  
Government Polytechnic,  
UJJAIN

The Principal,  
Government Polytechnic,  
KHANDWA (M.P.)

The Principal,  
Government Higher Secondary  
School,  
SIRALI (Madhya Pradesh)

Shri R.D. Bairagi,  
Principal,  
Polytechnic Institute,  
KHURAI (Madhya Pradesh)

The Principal,  
Polytechnic,  
SEONI (M.P.)

Shri B.S. Gill,  
Principal,  
Government Mining  
Polytechnic,  
KHIRSDOH  
(Distt: Chhindwara)

The Principal,  
Women's Polytechnic,  
BHOPAL

Shri A. Ghosh,  
Principal,  
Government Polytechnic,  
KHILGAON

The Principal,  
Dhantari Polytechnic,  
Rudri, Dhantari (M.P.)

Industrial Training Institute,  
RAJPURA

Shri S.R. Vaish,  
Principal,  
B.P.K. Govt. Industrial and  
Technical Instt., VARANASI

Shri R. D. Saxena,  
Principal,  
Govt. Industrial and Technical  
Institute, DEHRA DUN

The Principal,  
Training Institute for Physical  
Education, Kandivli,  
BOMBAY-67

Shri J.G. Parikh,  
Executive Director,  
Sasmira, The Silk & Art  
Silk Mills, Research  
Association, Dr. Annie Besant  
Road, Worli, BOMBAY-48.

Shri P. V. Thomas,  
Principal,

MISCELLANEOUS VIII

Sri M. V. R. Dikshitulu,  
Superintendent,  
Government Ceramic Institute,  
Gudur, Nallor District.

The Principal,  
Training Institute for Physical  
Education, Kandivli,  
BOMBAY-67.

The Principal,  
Institute of Textile Technology,  
TRIVANDRUM

Shri J.G. Parikh,  
Executive Director,  
Sasmira, The Silk & Art  
Silk Mills, Research Associa-  
tion, Dr. Annie Besant Road,  
Worli, BOMBAY-18

The Principal,  
Government Basic Training  
College, Laximpur (Panna) M.P.

Shri P. V. Thomas,  
Principal,  
Government Institute of  
Printing, Technology,  
BOMBAY-1 (Dr. D.N. Road).

Shri V.K. Srinamulu,  
Principal,  
Regional School of Printing,  
Broadway, MADRAS

Sri K. Padmanabhan,  
Principal-In-Charge,  
Institute of Leather Technology,  
Adyar, MADRAS-20

Shri S.P. Khanna,  
Principal,  
Government Tanning Institute,  
JULLUNDUR

Shri B. Sivathanu Pillay,  
Principal,  
Institute of Film Technology,  
Adyar, MADRAS-20.

The Principal,  
Government Institute of  
Surgical Instruments Technology,  
SONEPAT

Shri J.M. Badhe,  
Principal,  
Kala Niketan, Amravati.

Shri Jeet Malhotra,  
Principal,  
Chandigarh College of  
Architecture,  
CHANDIGARH

Shri S. M. Das Gupta,  
Principal & Secretary,  
Shri Govindram Seksaria  
Technological Institute,  
7, Park Road,  
INDORE-3

Shri S. Sabhanathan,  
President,  
Srinivasa Subbaraya Polytechnic,  
Puttur, Mayuram R.M.S.,  
Thanjavur District,  
PUTTUR

Shri V. V. Natu,  
Principal,  
Samrat Ashok Technological  
Institute,  
VIDISHA (Bhilsa) M.P. C. Rly.

Shri I. S. A. Jesudian,  
Principal,  
Virudhunagar S. Vellaichamy  
Nadar Polytechnic,  
VIRUDHUNAGAR

Shri R. G. Buldeo,  
Principal,  
Government Polytechnic,  
JABALPUR

Shri G. Rama Rao,  
Principal,  
Murugappa Chettiar Memorial  
Polytechnic,  
AVADI-MADRAS-54

Shri S. N. Awasthy,  
Principal,  
Dhantari Polytechnic,  
DHANTARI (Rudri) M.P.

The Principal,  
P. S. G. Polytechnic,  
Peelamedu,  
COIMBATORE-4  
(S. India)

The Principal,  
Government Polytechnic,  
NOWGONG (Madhya Pradesh)

Shri M. R. Subbiah,  
Principal,  
Alagappa Polytechnic,  
KARAIKUDI-4  
(Ramanathapuram Dist.)

Sri G. M. Ussain,  
Principal,  
Government Polytechnic,  
NAGERCOIL

Shri G. Krishnamurthy,  
Principal,  
Sankar Institute of Polytechnic,  
Sankarnagar P.O.  
Talaiyuthu R. S.,  
(Tirunelveli Dt.)

Shri H. R. Nagendran,  
Principal,  
Thiagarajar Polytechnic,  
Post Box No. 523,  
SALEM-5

Shri S. Sangareddi,  
Special Officer,  
Government Polytechnic,  
TUTICORIN

The Principal,  
Government Polytechnic for  
Women,  
ADYAR, MADRAS-29

Shri M. M. Rahman,  
Principal,  
Rajagopal Polytechnic,  
Gandhinagar, Gudiyattam,  
R. S. Post (M. A. A.)

Shri S. Ananakrishnan,  
Principal,  
The Ramakrishna Mission  
Technical Institute,  
Mylapore,  
MADRAS-4

Shri K. Srinivasan,  
Principal,  
C.K.T. Institute,  
VEPERY, MADRAS-7.

Shri K. Ansari Baig,  
Principal,  
Government Polytechnic,  
Thorapady Post,  
VELLORE-2

Dr. A.G. Kantayya,  
Principal,  
Valivalam Desikar Polytechnic,  
NAGAPATTINAM

Shri N. Gnanasambandhan,  
Principal,  
Tamilnad Polytechnic,  
MADRAS - 11

Shri A. Ramaswami,  
Principal-in-charge,  
Bhaktavatsalam Polytechnic,  
KANCHI

Shri R. S. Subramaniam,  
Principal,  
Nachinathu Polytechnic,  
POLLACHI

The Principal,  
Government Polytechnic,  
Perintalmanna,  
P.O. ANGADIPURAM

Shri A.C.P. Ribeiro,  
Principal,  
Government Polytechnic,  
3, Mahapalika Marg,  
BOMBAY-1

The Principal,  
Bombay Technical School of Engg.,  
Ground Floor, Hind Vidyalaya  
High School Building,  
Angewadi, Tilak Nagar,  
V.P. Road, Girgaum, BOMBAY-4.

Shri S. S. Desnavi,  
Principal,  
M.H. Saboo Siddik Polytechnic,  
8 Shepherd Road,  
BOMBAY-8 (BC)

The Principal,  
St. Xavier's Technical  
Institute,  
Cruickshank Road,  
BOMBAY-1.

Shri S.G. Sathaye,  
Head Master,  
Northcote Tech. High School,  
SHOLAPUR

Shri M.H. Gunda,  
Principal,  
Government Polytechnic,  
Poona University Road,  
POONA - 16.

The Superintendent,  
Technical Institute,  
(Attached to the Fergusson  
College),  
POONA-4

Shri H.M. Ganesh Rao,  
Principal,  
Govt. Polytechnic,  
SHOLAPUR.

Prof. R.K. Mody,  
Principal & Secretary,  
Victoria Jubilee Technical  
Institute,  
Matunga, BOMBAY-19.

Shri C. Jayavidyacharya,  
Principal,  
Government Polytechnic,  
AMRAVATI.

The Principal,  
Government Polytechnic,  
AURANGABAD.

Shri V.G. Dadhe,  
Principal,  
Government Polytechnic,  
RATNAGIRI

Shri G. Siddaveerappa,  
Principal,  
Govt. Polytechnic,  
TUMKUR.

The Principal,  
Government Polytechnic,  
Kolhapur (Maharashtra)

The Principal,  
D.R.R. Polytechnic,  
DAVANGERE

The Principal,  
Silver Jubilee Polytechnic,  
BHADRAVATI (Mysore).

Shri N. S. Jathanna,  
Principal,  
Govt. Polytechnic,  
KARWAR

Shri D.N. Hukeri,  
Principal,  
B.V.V. Sangha's Polytechnic,  
BAGALKOT.

The Principal,  
Polytechnic for Women,  
BANGALORE.

The Principal,  
Karnataka Polytechnic,  
MANGALORE - 4

Shri K. Nageswara Iyer,  
Principal,  
Acharya Pathawala Polytechnic,  
BANGALORE-19.

Shri S.N. Parappa,  
Principal,  
Polytechnic,  
CHINTAMANI (Mysore).

Shri S. Nageshappa,  
Principal Incharge,  
Government Polytechnic,  
BELGAUM

Shri R.W. Nanjundappa,  
Principal,  
CPC Polytechnic,  
MYSORE.

The Principal,  
D.A.C.G. Polytechnic  
CHICKMAGALUR (Mysore)

The Principal,  
Kalachand Devchand Polytechnic,  
PATAN (N.G.)

Shri M. Mahapatra,  
Principal,  
School of Engineering,  
BHADRAK (Dist. Balasore)  
Orissa.

The Principal,  
School of Mines,  
Coromandel (Mysore State)

Shri G. S. Mishra,  
Principal,  
G.A. Vidyapitha,  
PURI.

Shri D.S. Misra,  
Principal,  
Kendrapara Engineering School,  
KENDRAPARA

Shri G. S. Mishra,  
Principal,  
G.A. Vidyapitha,  
PURI

The Principal,  
Orissa School of Engineering,  
CUTTACK

The Principal,  
Ramgarhia Polytechnic,  
PHAGWARA (P.O. Satnampura)

The Principal,  
J.R. Govt. Polytechnic,  
HO SHIARPUR

Principal,  
Govt. Polytechnic for Women,  
CHANDIGARH

The Superintendent,  
Thapar Polytechnic,  
Thapar Institute of Engineering,  
& Technology, PATIALA

The Principal,  
Central Polytechnic,  
CHANDIGARH

The Principal,  
Government Industrial School,  
LU DHIANA

The Principal,  
Government Polytechnic,  
Kota

The Superintendent,  
Chhotu Ram Polytechnic,  
ROHTAK

Shri K.G. Pillay,  
Principal,  
Kirodimal Govt. Polytechnic,  
RAIGARH

Shri N.N. Sarin,  
Principal,  
I.T.C. Dayanand Polytechnic  
Instt.,  
AMRITSAR

Shri V.S. Gangal,  
Principal,  
Udaipur Polytechnic,  
UDAIPUR

The Principal,  
Government Polytechnic,  
SIRSA

The Principal,  
Bikaner Polytechnic,  
BIKANER

Shri D.R. Gambhir,  
Principal,  
Government Polytechnic,  
AMBALA CITY (Punjab)

The Principal,  
Govt. Polytechnic,  
AJMER Makhapura  
(Rajasthan)

The Principal,  
Govt. Polytechnic,  
JHAJJAR

Shri B.K. Jain,  
Principal,  
Alwar Polytechnic,  
ALWAR

Shri Gurbux Singh,  
Principal,  
Punjab Polytechnic,  
NILOKHERI (Distt. Karnal)

Shri S.B. Gupta,  
Principal,  
D.N. Polytechnic,  
MEERUT

Shri Y.P. Mayer,  
Principal,  
Mehr Chand Polytechnic,  
JULLUNDUR CITY

Shri S.B. Gupta,  
Principal,  
D.N. Polytechnic,  
MEERUT



Shri C. S. Sirohi,  
Principal,  
Govt. Agriculture School,  
BULANDSHAHR.

Shri S. D. Singh,  
Principal,  
Govt. Secondary Technl. School,  
GHAZIPUR

The Principal,  
Chandauli Polytechnic,  
CHANDAULI (Varanasi).

Shri M.P. Pathak,  
Principal,  
P.M.V. Polytechnic,  
Premnagar, MATHURA (U.P.)

Shri J.R. Mansingh,  
Principal,  
Government Polytechnic,  
KANPUR.

Shri D.K. Laroia,  
Principal,  
Nainital Polytechnic,  
NAINITAL

The Principal,  
Government Secondary Technical  
School,  
JAUNPUR

Shri R. S. Agrawal,  
Principal,  
Murlidhar Gajanand Polytechnic,  
HATHRAS

Shri G. S. Sharma,  
Principal,  
Govt. Polytechnic,  
JHANSI

Shri Mohan Lal,  
Principal,  
Maharana Pratap Polytechnic,  
GORAKHPUR.

Shri B.N. Prasad,  
Principal,  
Town Polytechnic,  
BALLIA

Shri Anand Narayana,  
Principal,  
Handia Polytechnic,  
Handia, ALLAHABAD.

Shri D.N. Jayakar,  
Principal,  
Govt. Polytechnic,  
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Technology,  
CALCUTTA.

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## 2. Contact periods in Technical Institutions at first degree level

### Purpose of the Study:

Considerable variation in the contact periods practised in different institutions is one of the factors responsible for an appreciable disparity in their standards of attainment. The All India Council for Technical Education (AICTE) has suggested among other things, for the 5-year integrated course in Engineering, the number of institutional contact hours considered very essential in order that a prescribed standard of attainment could be maintained. Though this was meant to be a broad guide line only, it was generally expected that no institution would go below this mark. This expectation has not, however, always been fulfilled. It is noticed that a large number of the institutions actually work for a much shorter period.

1.2 An attempt is made in this note to highlight the prevalent divergent practices in this regard and suggest a uniformity, without infringing on the academic freedom of the individual institutions. This study is, however, confined to Technical Institutions at first degree level only.

### Method and Scope of the Study:

2.1 The questionnaire sent to the different first degree Technical Institutions covered two main aspects:

- a) Total number of working days in a year (excluding examination days,) and
  - b) Total number of working hours per week.
-

2.2 Replies have been received from only 34 institutions. However, these cover most of the States in the country. The data is thus considered to be reasonably adequate for the purposes of this note.

2.3. Regions covered by the replies are: Andhra Pradesh, Assam, Bihar, Delhi, Gujarat, Jammu & Kashmir, Kerala, Madhya Pradesh, Madras, Maharashtra, Orissa, Rajasthan, Uttar Pradesh and West Bengal. Except for Assam and Jammu & Kashmir, the data covers more than one institution from each region.

2.4 Details of institutions studied <sup>and</sup> classified, according to their administrative set-up, are as follows:-

a) Institutions controlled by State Govts...	17
b) Institutions controlled by Central Govt..	6
c) Institutions controlled by Central and State Governments ....	3
d) University Colleges .....	5
e) Private .....	1
Total	<u>32</u>

TABLE I

Contact periods in different State Government Institutes

Region	Working days per year	Working hrs. per week	Total working hrs. per year	Remarks
(1)	(2)	(3)	(4)	(5)
Gujarat	a) 217 days	33 hrs.	1193 hrs	Total working hrs. per year are calculated on the basis of 6 day week.
	b) 198 "	34 "	1122 hrs.	
Madhya Pradesh	c) 186 "	32.5 "	1008 "	
	d) 192 "	36 "	1152 "	
Kerala	e) 180 "	39 "	1170 "	
	f) 160 "	36 "	960 "	
Madras	g) 180 "	33 "	990 "	
	h) 180 "	40 "	1200 "	
Andhra Pradesh	i) 180 "	34 "	1020 "	
	j) 180 "	32.5 "	975 "	
Delhi	k) 212 "	34 "	1200 "	

(1)	(2)	(3)	(4)	(5)
Maharashtra	l) 178 "	41.5 "	1231 "	
Uttar Pradesh	m) 225 "	39 "	1463 "	
	n) 189 "	39 "	1228 "	
Bihar	o) 175 "	40 "	1167 "	
West Bengal	p) 235 "	42 "	1645 "	
Assam	q) 180 "	40 "	1200 "	

Table - 2

Contact periods in Institutions under Central Government.

Region	No. of working days	Working hrs. per week	Total No. of working hrs. per year.	Remarks
Madras	a) 195	39	1248 hrs	
Delhi	b) 195	30	975 "	
Maharashtra (Bombay)	c) 192	36	1052 "	
Uttar Pradesh (Kanpur)	d) 180	25	810 "	
West Bengal (Kharagpur)	e) 190	33	1028 "	
Bihar	f) 180	37.5	1125	

TABLE - 3

Contact periods in Institutions under Central and State Governments.

Rajasthan	a) 170	35	992
Andhra Pradesh	b) 180	30	900
Bihar	c) 150	39	975
Orissa	d) 200	40	1333
J & K	e) 175	36	1050

TABLE - 4

Contact periods in University Engineering Colleges

Region	No. of working days	Working hrs. per week	Total No. of working hrs. per year.	Remarks
Gujarat	a) 177	37	1092	
Rajasthan	b) 180	36	1080	
	c) 178	49 hrs.	1453	
Uttar Pradesh	d) 200	34	1133	
Orissa	e) 180	42	1260	

Among private institutions, only one institution in Gujarat State has responded. The corresponding figures for that institution are 193 working days and 29 hrs/week which work out to nearly 1255 instructional hours over the year.

Findings:

3.1 It is found that even among the institutions in the same State and under the same administrative control (i. e. State Government), considerable disparity in the contact periods exists.

3.2 Taking the country as a whole, the number of working days varies within a very wide range. In the limited data available, the range is from 150 to 235 days.

3.3 Generally, institutions with a smaller number of working days, resort to a larger number of weekly working hours, in an attempt to make/the total number of contact hours. This results, in certain instances, in excessive strain and may even render continuous assessment of the students difficult.

3.4 Quite a large number of institutions work for less than 200 days or 1200 hours per year i. e. less than the minimum contact period suggested by A. I. C. T. E.

There are instances when institutions just adhere to the minimum period fixed by the affiliating university and make no attempt to go beyond it - even when this minimum is as low as 150 days. At the other end, there are institutions in some States working for 235 days, putting in 1645 hours per year.



3.5 Some institutions like I. I. T., Kanpur (to give only one instance) attach considerable importance to Home Assignment. The students in this institution are expected to devote 30 hrs. for home assignment and only 25 hrs. for work in the institution.

#### Conclusions

4.1 While a rigid uniformity among all institutions is not desirable, there is considerable scope for some standardisation in general matters like number of working days or the total contact period. Such standardisation need not necessarily interfere with the academic freedom which is so very essential for the growth of the institutions to its full stature.

4.2 It is generally accepted that the first degree in our country is not always on par with that of Western universities - one of the ways open to bridge this gap is to increase the number of working days or contact hours.

4.3 The minimum of 1200 contact hours should be strictly insisted upon in all institutions. Non-adherence to this should result in withdrawal of recognition. However, the actual distribution of this period between institutional work and carefully defined "Home assignment" could be left to the institutions concerned.

Vocational-Technical Education for the  
Post-Primary Age-Group.

INTRODUCTION: The importance of a large scale vocationalisation of educational facilities is recognised on all hands. Broadly speaking, provision in this regard will have to be made for those who leave general education after 7th and 10th classes. The form and dimensions of the problem are reasonably clear for those who have completed their matriculation (class X) but the forms which this vocationalisation should take for those having some primary education but less than matriculation are less easy to define. This is partly because experiments in our country so far mainly in the form of multi-purpose schools and junior technical schools have not been an unqualified success and the job opportunities are such that there is a surplus of degree and matriculate holders who can more easily compete for the few jobs than those who have only primary education.

It must be recognised that for some time the bulk of the younger generation will not proceed beyond the primary stage in full-time schooling. This figure is expected to be hardly 22% of the number enrolled at the first standard. Even in this relatively small percentage of students who voluntarily remain in full-time education beyond class VII there will be quite many who are not gifted for or interested in the general academic type of education. For them it is necessary to provide technical biased education suited to their tastes. This will mean the expansion of technical higher schools of a pre-vocational nature after duly remedying the defects in the programmes currently in force for students in this age-group.

The present note is about facilities for Vocational education to the school leavers during or at the end of the primary stage of education.

General Considerations to be kept in view:

In examining the problem of provisions to be made for those who drop out with only primary education, account must be taken of a number of social factors, as follows :

(a) As has already been noted, the organised employment market in India is growing much more slowly than the stock of educated man-power. In the figures given by the Institute of Applied Man-power Research, the projections for 1975-76 show 7.8 million Matriculates in excess of the number of jobs in the organised labour market. Obviously, the primary school leaver will be more and more handicapped in competing for posts in this market.

(b) With growth of industry in India there has been a marked decline in the number of the village and household artisans group, particularly in the rural areas. According to some educationists, this group comprised some 40 per cent of the village population around 1905 whereas it only accounted for less than 5 per cent of the same population in 1961-62.

(c) A large economic group in India is formed by the landless agricultural labourers who account for some 60 million of those on the land. Wages by this group are below a level which can maintain a large family. Again, there is a large group of farmers (some 40 million) holding less than .5 acres of land - holding yielding less than is necessary to maintain a large family.

(d) One result of the above facts and the education of the sons and daughters of these groups is a drift to urban areas of those whom the family can no longer support. This group would comprise more and more of those who have some primary education and who arrive in the cities unable to find work except of a casual kind.

The proposed programmes:

Since the organised labour market will be unable to absorb the large percentage of the products of the primary schools, it would be necessary to design a type of education which could lead to self-employment, household employment or employment in cooperative enterprises, particularly in villages and small towns. Such a vocational education should contain a large element of general education so as to equip the students to cope with the problems of marketing dealing with Government departments, keeping accounts etc. as well as a vocational element for the development of technical skills.

For those who drop out before completion of class VII, a greater element of general education would be needed in order to bring them to the required minimum standard of attainment.

A growing percentage of children will be made up of those who have completed four or five years of primary education. To ensure that investment in them is not dissipated, the system should provide for some further education and training to fit them for life.

The Government of India have recently instituted a scheme of youth vocational centres for imparting composite general and vocational education to children in the age-group of 11-14 years who for

lack of scholastic aptitude or for economic reasons have discontinued their education after primary education. This scheme envisages the setting up of about 65 centres in the first instance with provision for the training of its own craft instructors. The project is still in a pilot stage and its evaluation could be taken up only after two or three batches of students have come out by about the middle of the fourth Plan. However, from first accounts it appears that these centres are doing fairly well though there are a good number of loopholes to be rectified. For instance, the criticism that the age-group 11-14 is too tender for the type of crafts taught in these centres is quite unfounded. It is seen that boys are taking well to these crafts.

Some of the defects noticed in the scheme of youth vocational centres are :

- (a) The training leads to a virtual blind alley;
- (b) The training is restricted to the age group 11-14 years;
- (c) No provision for further training of the products has yet been made.

If these defects are removed, it is believed that this scheme which has been reasonably well conceived can deliver the goods. Instead of multiplying such schemes, it would be profitable to strengthen this project. By offering more attractive stipends instead of a paltry sum of Rs. 10/- as at present, greater number of boys could derive the benefit. Any expenditure in this regard would appear worthwhile.

This scheme of youth vocational centres makes provision of both full-time and part-time courses. As dropping out of the school after the primary stage is mostly for economic considerations, the students would rarely be idling away their time but doing some work or the other. Therefore, full-time courses would not be so useful. As far as possible, these training programmes should be on a part-time basis, preferably with evening classes. For children engaged in agricultural operations these programmes could be conveniently concentrated in the off-season for one or two months as required.

Again, training only in conventional courses like fitting, turning, carpentry, blacksmithy, welding, sheet metal working, would not be adequate. More diversified courses are necessary. In U.K., for instance, training is arranged in about 200 courses, a list of which is attached for ready reference. Training should be conducted in our country also in as many of these courses as possible, suitably adapted to our economy.

In the design of these training programmes there should be no rigidity in the pattern to be followed. The duration and contents should be flexible enough to meet the requirements of trade, previous experience of students and their academic back-ground.

Allowed

One important precaution to be taken is that these training programmes while being terminal in character should not end in a blind alley in respect of really bright and competent boys. Suitable bridges to come back to general stream should be provided in such exceptional cases. It should be emphasised that such cross-overs should not be as a general rule. Also no equivalence need to be attempted between such training programmes and general education attainments. There should, however, be provision for all the products of such courses to receive further training on a part-time basis to improve their professional competence.

Instead of restricting these training programmes to the age-group 11-14, it would be desirable that no minimum age for admission should be fixed. However, the maximum age should be placed at around 20 years.

In view of a large number of such training schemes required to cover the entire country, a start should be made with rural areas, electrified or likely to be electrified very soon, with necessary irrigation facilities. Indiscriminate opening of such courses on other than sound technical considerations would not be conducive to the success of this scheme.

In the drawing up of these programmes local employers should be closely associated at every stage and training adjusted to suit their requirements. Frequent workshop type conferences should be arranged between the employers and the training staff to review the working of these schemes. Local Councils with influential representatives of the people would also be helpful in running these schemes on sound lines. Provision should be made for sound counselling service also.

The staff for these programmes should be carefully selected if they are not to go the same way as the multipurpose schools.

Lastly, these training programmes should be attached to polytechnics and junior technical schools to make full use of existing training facilities. Adequate preparation should be made before starting these training programmes. Mere opening of centres on paper without equipment or adequately qualified staff would not serve the purpose. This should be carefully avoided.

Courses of Further Education

A few of the diversified Courses adopted  
for training in U.K.

Agriculture

Agriculture  
Farm organisation and  
management.  
Forestry  
Horticulture  
Poultry practice

Architecture

Architecture  
Landscape architecture

Art and design

Art metalwork and  
jewellery design  
(including metal crafts  
and silversmiths' design)  
Art Teachers Diploma  
Ceramics  
Design (General)  
Dip. A. D.  
Fashion design  
Furniture design  
General Art  
Graphic design (includ-  
ing commercial art  
and illustrating)  
Industrial design  
Interior decoration  
Intermediate certificate  
in Art and Crafts  
Painting  
Sculpture  
Stained glass  
Textile design  
Window dressing & display

Building

Brickwork  
Building for emanship  
Building inspectors  
Builders' quantities  
Carpentry and joinery  
Clerk of works  
Concrete practice

Concrete Technology  
Furnace brickwork  
Gas fitters' work  
General building studies  
Glazing and allied trades  
Heating and ventilating  
(installation and fitting)  
Highways and works superinten-  
dents  
Masonry  
Mastic asphalt work  
Painting and decorating  
Plasterers' work  
Plumbing and sanitary engi-  
neering.  
Roadwork. (road masons and  
paviors)  
Roof slating and tiling  
Structural engineering  
Wall and floor tiling,  
including torrazo and  
mosaic work.

Business and administration

Accountancy  
Advertising  
Book-keeping  
Business studies  
Commerce  
Company secretarial practice  
Costs and works accountants  
Currency and banking  
Estate agency  
Estate management  
Expert practice  
Hospital administration  
Industrial administration  
Industrial for emanship  
Insurance  
Law Legal executives  
Librarianship  
Local and central government  
and public administration  
Management  
Marketing  
Office management  
Office studies  
Operational research

Personnel management  
Purchasing officers  
Salesmanship  
Secretarial  
Stock Exchange practice  
Taxation  
Time and motion, and work study

Town Planning  
Works management  
Other business and administrative studies (including combined studies)

\* Catering

Catering basic trades  
Cookery for hotel and catering trades  
Hotel and catering  
Institution management and housekeeping  
Licensed house staff  
Waiters and hotel assistants

\* Chemical and allied occupations

Chemical plant operation  
Chemical technicians  
Chemical technology  
Chemistry as applied to the textile industry  
Coal processing  
Cosmetic chemistry  
Fuel technology  
Gas manufacturing and utilisation  
Leather manufacture, dyeing and finishing (excluding leather goods manufacture)

Paint technology  
Paper technology  
Petroleum and petroleum products  
Printing ink technicians  
Rubber technology  
Rubber Workshop practice  
Synthetic fiber manufacture  
Technology of plastics

\* Clothing & Footwear manufacture

Boot & shoe manufacture  
Dress manufacture  
Embroidery and lace manufacture

Hosiery and knitted goods manufacture  
Millinery  
Tailoring  
Other clothing trades

\* Agricultural

Agricultural engineering  
Farm machinery maintenance  
Horticultural machinery maintenance

\* Automobile

Motor vehicle engineering  
Motor vehicle painting  
Panel beating  
Vehicle body building

Chemical

Chemical engineering

Civil

Civil engineering  
Civil engineering (gas)

\* Combined

Combined engineering  
Control engineering  
General Engineering

\* Electrical

Electrical engineering  
Electrical fitting  
Electrical installation  
Electronic engineering  
Electronic servicing  
Radar  
Radio and television servicing  
Telecommunications

\* Marine

Marine engineering

\* Mechanical

Fabrication of steelwork  
Mechanical engineering  
Mechanical engineering craft practice.

Mechanical engineering  
inspection  
Mechanical engineering  
technicians  
Workshop technology and  
practice.

\* Production

Ergonomics  
Precision engineering  
Production engineering

\* Other

Blacksmithing  
Boiler house practice  
Boiler making  
Corrosion engineering  
Engineering drawing  
Engineering planting,  
estimating & costing  
Gas Engineering  
Guided missiles  
Heating and Ventilating  
engineering  
Illuminating engineering  
Industrial radiography  
Instrument engineering and  
maintenance  
Metal finishing and electro-  
chemistry  
Metal plate work  
Metrology  
Miscellaneous engineering  
and metal trades  
Naval architecture  
Press tool making  
Rail carriage building  
Refrigeration engineering  
Scientific instrument  
manufacture (including  
optical instruments)  
Sheet metal work  
Shipbuilding  
Textile engineering  
Traffic engineering  
Watch and clock manufac-  
ture  
Welding.

\* Food trades

Bakery and flour confectionary  
Brewing

Chocolate and sugar  
Confectionery  
Dietetics  
Flour milling  
Food inspection, analysis  
and hygiene  
Food technology  
Food trades not otherwise  
specified  
Milk pasteurisation  
Processing and  
distribution.

General Certificate of  
Education

G.C.E. Ordinary level  
G.C.E. Advanced level

\* Health & Welfare

Cardiography  
Child care  
Dental nurses/assistance  
Dental technicians  
Dispensing assistance  
Dispensing opticians  
Health visitors  
Manicure and chiropody  
Medical laboratory  
technicians  
Medicine  
Nursery nursing  
Nursing (medical)  
Ophthalmic opticians  
Pharmacy  
Pharmacology  
Physiotherapy  
Pre-nursing  
Public Health inspection  
Radiography  
Social work  
Speech therapy  
Surgical laboratory  
Technicians  
Other public health subjects.

\* Home economics

Cookery  
Domestic subjects  
Dressmaking  
Home management  
Millionery  
Needlework and embroidery  
Tailoring  
Upholstery and soft furnishing  
Weaving



\* Languages

Chinese  
Danish  
Dutch  
English  
French  
German  
Italian  
Latin  
Portuguese  
Russian  
Spanish  
Swedish

\* Metal manufacture

Foundry practice and  
pattern-making  
Foundry technology  
Iron and Steel manufacture  
Metallurgical technicians  
Metallurgy  
Non-ferrous metals manu-  
facture

\* Mining and Quarrying

Colliery electricians  
Colliery mechanics  
General coal mining  
Mining and quarrying  
(other than coal)  
Mining deputies and managers  
Mining engineering

\* Miscellaneous manufacturing

Brickmaking  
Furniture and upholstery  
Glass manufacture  
Goldsmiths' and silversmiths'  
Work (excluding design)  
Jewellery manufacture  
Leather goods manufacture  
Musical instruments  
manufacture  
Pottery manufacture  
Tobacco processing  
Woodcutting mechinists  
work  
Other manufacturing trades  
Music and drama  
Drama  
Music

Natural Sciences

\* Biological sciences

Applied biology  
Bacteriology  
Biochemistry  
Biology  
Botany  
Physiology  
Zoology

Chemistry

Applied chemistry  
Chemistry

\* Mathematics

Applied Mathematics  
Computing  
Mathematics  
Numerical analysis  
Statistica  
Technology Mathematics

Physics

Applied physics  
Physics

\* Other natural sciences

General Science  
Geology  
Science laboratory technicians

\* Nautical subjects

Nautical catering  
Radiotelegraphy  
Seamanship and navigation

\* Printing and book production

Book production  
Bookbinding  
Electro and stereo-typing  
Line composition  
Lithographic printing  
Monotype casters' work  
Monotype composition  
Photo engraving  
Photogravure  
Photo-lithography  
Printing administration  
Printing (general)  
Printing warehouse practice

Publishers' edition binding  
Technical authorship and  
illustration  
Typography (compositors' work  
and letterpress machine  
printing)

\* Social sciences

Economics  
Geography  
History  
Humanities and social studies.  
Psychology  
Sociology  
Other social sciences

\* Surveying

Mine surveying  
Quantity surveying  
Surveying

\* Textile Manufacture

Carpet and upholstery  
fabric manufacture  
Cotton manufacture  
Dyeing of textiles  
Silk manufacture  
Synthetic textile manufacture  
Textile merchandising (where course  
has technological content)  
Textile printing  
Textiles (general)  
Woollen and worsted  
manufacture  
Other textile manufacture.

\* Transport

Air transport  
Rail transport  
Road transport  
Shipping  
Undefined transport

\* wholesale and retail trades

Flower display and management  
General and undefined  
distribution  
Other commodities (defined)  
Grocery  
Meat trade and meat  
distribution  
Other food distribution  
Paper merchandising  
Retail distribution  
Retail management and  
store-keeping  
Textile distribution

\* Other subjects

Cinema and film studio work  
City and Guilds Teachers'  
Certificate  
Hairdressing and allied  
services  
Humanities and technology  
Laundry and dry cleaning  
work  
Other personal services  
Photography (other than  
printing)  
Radio and television  
amateur  
Timber technology  
Yacht and boat building  
Veterinary subjects.

4. A Comparative Study of the Subjectwise Allocation of Instructional Hours in I. I. Ts.

General

While submitting their memoranda/replies to the questionnaire issued by the Commission, some educationists in the country have strongly pleaded for uniformity among the first degree technical institutions. According to them, one of the major causes for the falling standards in our Engineering Colleges is the prevalent wide divergence in the content and organisation of the different courses and also the relative emphasis placed on the various subjects. Pointing out that even among the 5 I. I. Ts. there is no similarity on these points, they feel that the only remedy is to make higher Technical Education a concurrent subject so that rigid uniformity could be enforced all over the country on issues like, admission procedures, syllabus, examination system etc. It may be pointed out here that it is the experience of all advanced countries that any rigid uniformity kills the initiative of the institutions concerned, resulting in exactly the opposite of the desired objective of raising the standards. The trend, therefore, in all such countries is to allow selected higher technical institutions enough academic freedom in the organisation of their courses, according to their own genius.

Nature of the Study Undertaken

In our country, considerable academic freedom is already enjoyed particularly by the 5 I. I. Ts. A comparison is attempted in this note of the subject-wise allocation of instructional hours, as practised by them, for the Mechanical Engineering course. To bring out the prevalent latitude in the organisation of the courses, the corresponding figures suggested by the A. I. C. T. E. are also given. Similarly, the practice obtaining in a private institution is also reproduced.

For purposes of this study, the subjects are grouped under a) Humanities, b) Science and Mathematics and c) Engineering Science. Wherever information is available, time allocated for drawing and workshop is also separately mentioned.

: 94 :  
5-year Integrated Course  
(Mechanical Engineering)

Ist year      Allocation of time (in hours)

Institution	Humanities	Science & Mathematics	Work-shop	Draw-ing	Total	Time devoted to practicals including tutorials Drawing
I. I. T. Delhi	176	576	144	192	1088	784
I. I. T. Madras	96	400	560	192	1248	944
I. I. T. Kharagpur	240	540	120	150	1050	510
I. I. T. Kanpur	120	510	90	90	810	465
I. I. T. Bombay	112	752	128	96	1088	640
A. I. C. T. E.	100	400+200	200	300	1200	-
Birla Institute of Science & Technology, Pilani,	240	750	-	-	990	600

2nd Year

Institution	Humanities	Science & Mathematics	Engineer-ing Science	Total hrs.	Time devoted to tutorials & practicals.
I. I. T. Delhi	96	736	240	1072	704
I. I. T. Madras	96	352	800	1248	800
I. I. T. Kharagpur	110	540	290	940	550
I. I. T. Kanpur	120	345	330	795	450
I. I. T. Bombay	64	688	336	1088	640
<u>A. I. C. T. E.</u>					
Birla Institute Pilani,	240	435	225	900	360

3rd Year

Institution	Humanities	Science & Maths.	Engineering Science	Total	Time for Tutorials & Practicals
I. I. T, Delhi	64	176	704	944	512
" Madras	60	180	978	1218	450
" Kharagpur	60	150	840	1050	480
" Kanpur	120	150	645	915	510
" Bombay	64	152	792	1008	544
A. I. C. T. E.	-	100	1000 + 100 hrs. Genl.	1200	N.A.
Birla Institute Pilani	120	120	480	720	225

4th Year

I. I. T, Delhi	96	64	736	896	496
" Madras	60	120	1068	1248	438
" Kharagpur	60	30	990	1080	510
" Kanpur	30	-	750	780	330
" Bombay	32	88	968	1088	624
A. I. C. T. E.	70	70	860 + 200 Genl.	1200	630
Birla Instt. Pilani	120	-	510	630	180

5th Year

I. I. T, Delhi	48	-	816	864	464
" Madras	150	120	978	1248	821
" Kharagpur	30	-	990	1020	570
" Kanpur	60	-	690	750	480
" Bombay	-	-	992	992	528
AICTE	-	-	1000 + 200 Genl.	1200	730
Birla Institute, Pilani	-	-	825	825	435

Duration allotted to core curriculum

Institution	Duration
I. I. T. Delhi	2 Years
" Madras	2 "
" Kharagpur	2 "
" Kanpur	3 "
" Bombay	2 "
" AICTE	3 "
Birla Instt.	2 "

Weightage given to self-study/Home assignment

Institution	Weightage
I. I. T. Kanpur	30 hrs. out of 55 hrs. of work/week (i. e. 54% nearly)
I. I. T. Kharagpur	20 hrs. out of 55 hrs/week (36%)
Birla Institute	23 hrs. out of 46 hrs. of work per week (50%)

The following points emerge from this study:

1) Especially among the I. I. Ts. there is no rigid uniformity hampering their free development. Even the time devoted for study of core subjects is not uniformly the same in all institutions.

2. Detailed syllabuses followed in different institutions are substantially the same. A mere comparison of topics listed in the printed syllabus would not be very useful, as a lot more would depend upon the relative emphasis laid on and the time devoted to different subjects.

3) Time devoted to practicals and tutorials (i. e. other than lectures) ranges between 40% and 75% for any particular year.

4) Among the I. I. Ts, the time allotted to institutional study (including tutorials and practicals) is the least

in I.I.T. Kharagpur is about 500 hours. The institution places far greater emphasis on home assignment - nearly 30 hours out of 55 hours of weekly work i.e. 54%. This heavy reliance on Home assignment is noticeable in a few other institutions also - like the Birla Trust of Science & Technology, Pilani.

5) Almost every institution places far greater emphasis on Science and Mathematics than indicated in the model syllabus of A.I.C.T.E. (While A.I.C.T.E. suggests about 1000 hours out of 6,000 instructional hours for Science and Mathematics, I.I.T. Delhi, to give only one instance, devotes nearly 1552 hours for these subjects, including tutorials.

6) Similarly, time allotted to teaching humanities also varies. While I.I.T. Madras, to give an example, gives 462 hours for this, Kharagpur considers an allocation of 500 hours necessary.

The I.I.Ts. have already made a mark in their own field which is largely due to the academic freedom enjoyed by them. In fact, they can play their part still more effectively if the snags hindering the exercise of their academic freedom are removed. This can be assured if each I.I.T. is given a university status, while retaining, at the same time, its name and individual character.

5. Drop-outs from Junior Technical Schools

Introduction: The Planning Commission has recently conducted a detailed study of the working of Junior Technical Schools. Their findings reveal a very high percentage (40%) of dropouts and also that nearly 45% of the students join polytechnics. With such a large percentage joining polytechnics and other higher institutions, the need for continuing this costly scheme of Junior Technical Schools would itself be open to serious question.

On the other hand, a few educationists have altogether a different view on this issue. They feel that the survey by the Planning Commission did not take account of all factors involved. Pointing out the instances of a few Junior Technical Schools in Avadi, Bhopal and some parts of West Bengal, they argue that the Junior Technical Schools are not a total failure after all. In their view, as even the objectives of this scheme are not correctly understood by all, no fair trial has been given to this scheme.

While the survey of the Planning Commission shows a high percentage of drop-outs, the exact causes for these drop-outs have not been gone into by them. These reasons may be over a wide range - from financial circumstances of the students, and bleak terminal prospects to inherent defects in the scheme itself. An attempt is made in this note to analyse the causes for these drop-outs.

Nature of Study:

About 54 Junior Technical Schools have responded



to the request of this Commission for furnishing particulars about the drop-outs from their institutions. Considering that at the time of this study only 86 schools were functioning and that many of these had not yet started the third year classes, this response was really encouraging.

Unfortunately, however, the term 'drop-out' has been differently interpreted by various institutions. Some institutions have included failures in examinations also as drop-outs. As a result, only such replies which attached the correct interpretation, namely, students who have for various causes given up their studies in Junior Technical Schools for good, are considered in this note. It is also found that many institutions have not troubled themselves with any follow-up study of these drop-outs and, as such, have very little useful data to furnish.

Findings: Screened in the light of these points, the data furnished by only 21 institutions merit a detailed study. For purposes of our analysis, the data relating to only a specific year, namely, of the final year conducted in 1964-65, is considered in this note.

<u>Total number of students covered in this study:</u>	726
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<u>Reported number of drop-outs:</u>	92
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At first glance, the above figures would show a far less rate of drop-outs than that arrived at by the Planning Commission. This difference is mainly due to the fact that the drop-outs as now reported refer only to the final year, without taking into

account the first two years of study. Further, as already stated, the interpretation attached to the expression "drop-out" has varied from institution to institution. Instead of attempting, therefore, to disprove the Planning Commission's findings with regard to the drop-out rate, it is proposed to concentrate our studies more on the break-up of the causes leading to these drop-outs.

The relative contribution of different causes for the total drop-outs can be summarised as follows:

1. Financial Considerations	8%
2. Rejoining General Education stream	35%
3. Inability to follow instruction	24%
4. Helping family calling	9%
5. Joining other institutions/courses	3%
6. Taking up employment	12%
7. Other causes	9%

A study of these replies brings out one more point very clearly. That is, the objectives of the scheme are sometimes totally misunderstood. According to one principal, the Junior Technical School "is a course which is a preparatory one for higher studies, university and polytechnics and also complete in itself for those who wish to go for technical jobs .....It should be made attractive for bright children as well as children of normal ability". It is obvious that no scheme which attempts to satisfy both these conflicting objectives can be fully successful. In fact, it was never the intention of the original framers of this scheme to accommodate

both these aims.

The replies also contain a number of useful suggestions for the improvement of the Junior Technical Schools. Many of the Principals have pleaded, among other things, for a clear definition of the terminal prospects of the students. A few others, while arguing on the one hand that the products of Junior Technical Schools should get the same considerations as the IIT trainees under the apprenticeship scheme, also plead that the former should get preference for admission to polytechnics and engineering colleges. As already stated, these are irreconcilable demands. Either the one or the other can be achieved if the scheme is to deliver the goods at all.

It would be a costly venture, not worth the investment involved, if the Junior Technical Schools should serve as a channel for feeding polytechnics and engineering colleges. The alternative of suitably recasting the scheme to raise the standard of technical skill of J.T.S. trainees, therefore, merits all consideration. One argument frequently advanced for not extending some concession under the Apprenticeship Act to J.T.S. students as for I.T.I. trainees is that the workshop training in Junior Technical Schools is too thinly spread over a number of trades. This point has to be met by increasing, if necessary, the total working hours as in the case of Industrial Training Institutes with a view to achieving the same trade skills. With this done, the products of the Junior Technical Schools would be preferable to the I.T.Is. trainees in view of their general education background.

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PAPERS  
BY  
CONSULTANTS

VOCATIONAL AND TECHNICAL EDUCATION

BY

RECTEUR J. CAPELLE

1. All education is general at its beginning and at a certain level has to be directed towards some professional training. Technical education cannot therefore be discussed independently from the whole educational system. This is why I do not think it advisable to have separate vocational training under different ministries. The Ministry of Industry, the Ministry of Commerce, the Ministry of Agriculture certainly know their needs better than the Ministry of Education; but it does not mean they can better organise the teaching of what they need. The Ministry of Education should be at the disposal of the many and very different customers in the government and in the private sector. But it is better qualified for doing the teaching and for assuming the responsibility of coordination which will prove to be more and more necessary in order to avoid expensive duplication and increase efficiency.

2. As an OECD expert, I have been examiner of technical education in Denmark, with Professor Dixon of the University of London. The various vocational schools were attached to various government departments. We found a great improvement was reached from the decision which made the Ministry of Education responsible for the entire educational system.

3. In India the industrial training itself is split into two parts of education: the one, called "educational and vocational" is attached to the Ministry of Education while the other ("the training of workers at various levels of skills" and "the training of first-level supervisors") is placed under the responsibility of the Ministry of Labour and Employment. I do not see a clear dividing line between these two responsibilities though some authorities in the Ministry of Labour and Employment, Government of India, see "very valid reasons" for such a division. According to them, "The SHIVA RAO Committee came to the conclusion that craftsmen training clearly falls within the sphere of the Ministry of Labour and Employment just as technical and vocational training would be the responsibility of the Ministry of Education." One may have sometimes the feeling that most of the Indian technical schools (junior technical schools as well as polytechnics) are keeping too much apart from actual industrial practice. Such a situation is probably due, to a certain extent, to the separation made between the training of the skilled workers and the

training of the other qualified agents of the hierarchy.

4. The present paper contains (1) factual observations (2) general views (3) suggestions for discussion. I am aware that my very limited knowledge of the situation in India does not allow me to build the following statements on a very strong basis. They are only tentative.

#### I. Factual observations

(1) Universities are attaining good international standard, due to the quality of the staff - national or visiting - and to the increasing role which is given to research. The Indian Institutes of Technology are excellent technical universities.

But all affiliated colleges may not have the same quality; their number is very great. Some are very small, too small to provide those research facilities which are the conditions for success in university.

The excessive appreciation for degree - versus diploma - and the flexibility of the affiliating system have led to "upgrading" some institutions which could better attempt being good at the diploma level rather than mediocre at the degree level. A degree should be concerned not only with the knowledge, but also the creativity of the graduate. When the environment is not providing research for the staff and for the best students, then the teaching can be done only with great difficulty, or lead to a real degree, whatever the name of the examination is.

Since it is generally recognised that many engineers are employed in routine work, through the lack of technicians, the following remarks will concentrate on the sub-university level.

(2) Technical education below the university level is not sufficiently coordinated with the level of general education attained by the student. It is not attractive enough, nor scientific enough, and its links with industry are sometimes non-existent.

The same kind of experiments in physics and mechanics and the same kind of workshop work are to be found in the secondary technical schools, in the junior technical schools and in some polytechnics; for example, in Delhi the students of a senior technical school and of a polytechnic located in the same campus are using the same workshop, doing the same practical work, together and at the same time. In Agra, the engineering college (degree) and the adjacent polytechnic (diploma) have almost identical laboratories (though absolutely separated): the students in the two schools are divided

into the two same streams (mechanical and civil engineering) and there seems to be no substantial difference between their practical training.

(a) The exercises made by the students in physics and mechanics seem to be a succession of writing and drawing with little link, if any, between them involving very little personal thinking from the student and probably transmitted from generation to generation without any reference to the new developments in sciences. The students are losing their time, for example, when they have to draw the shape of the instrument they have used in the workshop or elsewhere. At the 11th grade some students had to design a saw, a chisel, etc.

(b) The available experiments in physics and mechanics, whatever the level of the school, are the same: No change has been introduced for years. The reports of the students on these experiments show more attention for a mere description than for measurements and for a discussion of the results.

(c) The value of workshop training in general is sufficient where the instructors seem to be just artisans, not educators. The students are not given a pre-professional education which would help them to do good work that is intelligent work in the workshop. Sometimes, accuracy is very poor and the student is not given a sufficient knowledge of the notion of "tolerances".

The workshop is often dull, dusty; working and wrecked machines lie side by side; maintenance is insufficient; the pieces of wood or iron made by the student should be, more often, a part of a real instrument or apparatus in which they would be glad to contribute.

#### Ambiguous significance of technical schools

The Junior Technical Schools are supposed to prepare, simultaneously for craftsman apprenticeship as for entry to the polytechnics. This policy cannot give good results because -

- (1) the same curriculum cannot meet these two very different goals,
- (2) the students who have to stay at craftsman level - less than 50% - feel frustrated.

The technical schools are taking, after the primary schools, students who have not been admitted in regular secondary schools, but who still have the ambition of proceeding to higher study. Their programme is, in fact, more difficult and they should take the best students instead of taking the less gifted. This situation is providing more failures than

real successes.

To sum up, one may say that the whole system seems to be built mostly to encourage the students to go to a degree course: the other ways provided are more like escapes. The technical schools are considered like a consolation, not like a goal; the fact that their technical training is lacking links either with science or with industry is contributing to make them appear as a poor substitute unless they are looked upon as a second chance of going back to general studies. To put it bluntly, the technical training is sometimes non-scientific and frustrating in spite of the good-will and the competence of the headmasters and of most of the staff. The system itself, much more than the teacher, is responsible for it. The same kind of remarks apply to the secondary technical schools, though some I visited in Bombay are achieving good results in the access of their students to further studies. They are not technical enough to prepare real technicians; and the training that they give in workshop and mechanical experiments will be repeated in the same way, at the subsequent polytechnics.

## II. General Views

Three levels of qualification are recognised, the world over, and should be considered separately -

(a) the engineer with sub-divisions according to the priority given to fundamental science or to technology (both university level);

(b) the supervisor with sub-divisions into technician and higher technician;

(c) the craftsman with sub-divisions into semi-skilled, skilled and highly skilled.

Their respective range of responsibility is different: the craftsman is seeing his environment from a little height, say 100 meters; the supervisor is 1000 meters high whilst the engineer is dominating the whole complex from 10,000 meters. This means that each of these three groups has its particular type of responsibility, and that, therefore, their training, even for practical work, cannot be the same. We assume that the engineer is trained in the university or in an institute of the same level and that he is given facilities for practical work in industry, especially if he belongs to the technology-based group.

There seems to be no general need for the increase of the number of institutions of the level of a university. Some institutions possess equipment



which would enable them to increase their intake. Some colleges could be grouped to constitute bigger units; some had better prepare for diploma only. But the greatest needs are in groups (b) and (c) which have to increase their capacity and their quality. To attain this goal, their objective should be defined with precision, and their students should be motivated by the desire to attain this objective.

### Increasing role of the technician

Not long ago the needs of industry were covered by two kinds of qualified people: (1) engineers produced by schools of a high scientific level (universities or colleges); (2) operators and skilled workers who resulted from a workshop or industry based training. The intermediate qualification of supervisors was provided by the category of skilled workers; those who showed a particular professional capacity and especially a good human authority, were promoted to the responsibility of supervisors.

But with the increasing complexity of the work to be done, this kind of supervisors could not assume all the intermediate responsibilities and, therefore, an increasing number of engineers were called to do routine work, in which they felt frustrated and became rusty in such a way that they could not assume later the real creative responsibility of an engineer.

If it is admitted that the ratio between the total number of engineers and the total number of technicians should be 1 to 4 or 5, one can see that the main problem, in India, is not so much to increase the number of engineers, but to increase the number of technicians in order to make a better use of the engineers produced by the universities and the colleges.

In a modern enterprise it is considered advisable to have, working together, two sorts of technicians, coming from two sources:

(a) Some - may be 50% - come from the category of skilled workers; but in addition to their experience (both professional and human), they must have acquired a wide technological knowledge and a more scientifically based education which can be provided by some part-time training, provided in cooperation between industry and a neighbouring school (sometimes through correspondence courses).

(b) The others are educated by a school based system: their basic knowledge is of the secondary type; in addition they must have a good technological training and a real practice of the workshop; yet that technology and that practice are

not to be confused with the more manual training given to the skilled worker. The technician has not to acquire the manual ability of the skilled worker, but he must be able to control the work of the craftsmen and to supervise and coordinate the activity of a group, putting in practice the instructions given by the engineer.

The polytechnics seem to be the kind of schools suited to produce the school based technician; yet they have to improve their method to be more scientific in their experiments and workshop work, and more cooperative with the industry.

#### Technician and higher technician

With the increasing need for a more extensive diversification of qualifications to assist the engineer who is more and more absorbed by long term preparations, research, coordination, economic evaluation, a new type of higher qualification has appeared and is playing, in some countries, a major role in industry. It consists of a sort of immediate assistants to the university trained engineers: these qualified agents are called ordinary engineers in some countries (in Germany, for example) or higher technicians in the others. The definition of a higher technician could be: his formation corresponds to that of a technician, plus 2 years of specialization; his duty is to assist the engineer in applying his decisions. The higher technician is not responsible for creative work, but he must be able to supervise the work of a group of ordinary supervisors or technicians.

The difference between the higher technician and the university trained engineer is probably greater, in the content of their respective curricula, than the existing difference, in India between some curricula leading to degrees and some others leading to diploma.

The trend towards upgrading a college by transforming a diploma course into a degree-course, without changing considerably the staff or the equipment, seems to show that the tendency flourishes because the conditions of the training are too similar.

The Higher Technician schools, like the "Ingenieur Schule" in Germany or the Junior Colleges in the U.S.A., should have a very specific programme; their staff should not be oriented towards scientific research as should be the staff responsible for degree courses, but would be for engineers highly experienced in real industrial work or teachers selected among the best of the polytechnics.

If the difference between the level and the content of the degree courses and the diploma courses is clearly made, students of the schools for higher technicians would probably be more motivated by the desire to obtain a diploma of Higher technician than fascinated by the degree.

This separation does not eliminate the possibility for a very gifted student to transfer to a degree course in an appropriate institution, but such a transfer, which lengthens the duration of the studies and is, therefore, expensive for society, should be exceptional. The normal way for a higher technician to become an engineer should be found in the system of cooperative adult promotion.

In Germany, 10% of the best students having succeeded in the Ingenieurschule (Higher technician) are allowed to enter the technical university: but they have to start from the beginning, that is with the students fresh out of secondary education through the ABITUR. Yet one out of 4 or 5, only, are actually taking this advantage. Why? Because they know that if they are successful in industry they may be promoted to the highest responsibility, along with the university graduated engineers. A diploma man may have degree-men under him.

### The three steps of technical training

The traditional system was roughly this: from a certain level of general education the student was admitted in a technical training (institution based or industry based). That training consisted of producing the kind of work required by industry, with the same type of machines; after that training, the student was considered ready for immediate employment.

Today, more flexibility, more adaptability is required at all the levels of qualifications; because the complexity and the mobility of the industrial conditions of work are such that the student - whatever his level is - will have to do something different from what he has been taught in school. Therefore, education must be based for its technological aspect,

- more on the basic sciences,
- more on the polyvalent technological abilities.

Therefore, 3 successive steps can be found in the modern technical education (more clearly when the level is high):

(a) a pre-technological education as part of the general education;

(b) a technical training sufficiently adapted to the type and to the level of qualifications envisaged, but, at the same time, wide enough to allow further specialisation or reconversion of activity;

(c) a period of application on very definite work or responsibility in the enterprise, under the supervision and with the help of qualified staff having an ad hoc responsibility.

From these remarks comes the conclusion that our traditional secondary stream, with only general studies, is not properly adapted to the modern world: I think that every student in every school should be given, as a part of his general education, a pre-technological training, considered as an approach to the methodology of experimental sciences, whatever the kind of further studies he envisaged (humanities, sciences or technology). This pre-technological training is based on a certain spirit and on certain types of experiments, not on workshop practice.

#### Pre-technological training

I will be excused if I develop a little this feature, which is a particular point of the new French reform of pre-university education.

The lower secondary school, or middle school is considered of major importance for preparing the students for any kind of further studies. Its purpose is to develop the ability of the student in the use of the means of communication (mother language, other languages, mathematics); it is also to enable him to become adaptable to social life and adaptable to his professional responsibility.

This means that in addition to an approach to the social sciences, an approach must be envisaged to the experimental sciences, that is to the concept of material and to the concept of function.

The natural sciences (e.g. biology) provide such an experimental approach: the student is looking at an organ produced by nature and learns how it is made and how it fulfils its functions (ex: a muscle).

In the same way, the mechanical civilisation provides an immense reservoir of apparatuses which have been imagined by the intelligence of men, over many centuries, to fulfil the functions corresponding to his way of life. From that heritage particularly, in the environment of the school, it is possible to build up a certain number of experiments, conveniently chosen and linked between themselves,

and of polyvalent educational value. For example, the pedalling or braking mechanism of a bicycle, a tap, some simple tools, some simple gadgets may be used for such experimental education, particularly interesting for children between the ages of 14 and the age of 16 in secondary schools. Each group of 2 or 3 students should have an experiment to check the principle of each of these experiments would be this:

(1) A certain function is assumed (rotation of a door, helioidal motion, etc.) and a mechanism is presented which has been produced to fulfil that function;

(2) The mechanism is occasionally dismounted, and then put together (analysis and synthesis) whilst a discussion is carried on by the teacher to explain why the apparatus is made this way;

(3) Proper measurements are made and their accuracy discussed when possible;

(4) A drawing is made of certain parts of the apparatus which gives an opportunity of introducing the principles of industrial drawing;

(5) Some toys (scientific toys) or small multipurpose machine-tools could also be acquired. Of course, if a workshop is available, it provides many facilities for this kind of pre-technological training, but it is unnecessary at that stage. I would rather avoid it, because it would indulge the teacher in becoming a mere instructor of workshop training which is outside the scope, and still too narrow a view.

Note: The kind of pre-technological training which is envisaged here assumes that the students admitted in the middle school are sufficiently gifted to assimilate it.

When the middle school would some day absorb the entire age-group coming out of the primary school, some different curriculum will have to be provided in the middle school for the less-gifted children: it would include more than work, and more time devoted to practical work. Yet, the equipment used for the pre-technological training of the ordinary student could be used, at least most of it, for the practical training of those who are in difficulty in the more general or scientific studies.

III. Suggestions

(1) Since 20% only complete grade 7, it seems unrealistic to plan a 10-year compulsory

education for any appointed time in the future. It might be preferable

- (a) to improve the quality of the primary school, increase the salary of teachers and make primary school really compulsory for 7 years.
- (b) to organize a complementary part-time education for those who after grade 7, do not proceed to the middle school.

- (2) The Trade Schools at craftsman level should be full-time or part-time - that is school-based or industry-based - but, in all cases, should have the benefit of real participation from industry or commerce. At that level some "white collar" training should be developed, mostly for students having attended the middle school for commerce activity for example. But the skilled worker training might not require from the students to have attended the middle school: the boys could be accepted, when physically developed, even if they have left the primary school for 2 or 3 years, provided they are given some fundamental training through refresher courses.

Excellent vocational schools are to be found in industry at that level: they provide the best possible environment and in addition, they take students who have shown positive motivation and not the hope of escaping vocational application.

- (3) The middle school from grade 8 to grade 10 should be of a general type, without particular vocational aim, but should, at the same time, be of real pre-professional value.

At that level, the question of work experience is more a matter of social education, than of pre-scientific or pre-professional value. It should not be under-estimated. In addition, the accent should be put on the following points:

- (a) active participation of the students in the cleaning of classroom, workshop, corridors, outside parts of the campus.
- (b) participation of the students in the maintenance of the furniture, the apparatus, mechanical devices, etc.

(c) education of all students in pre-technological experimentation which would be of value for further experimental education, in the field of physics, mechanics or production technology.

(d) education of all students in home technology, which should not be limited to girls and should include more scientific experiments and approach than is usual when applied to traditional home economics.

(4) The higher secondary school would be one of the 3 ways opening after the middle school, the other two being the polytechnics or the trade school. Its 2 year courses would be preparatory to higher education, without being too much specialized. As an option, a technological training, could be envisaged.

(5) The polytechnics would take students after completing the middle school and would in 3 years prepare them for the real qualification of technician. For some fields students could be taken from higher secondary school. Most of the polytechnics should be of the sandwich type.

The junior technical school, or secondary technical school should, therefore, be turned into real trade schools or real polytechnics, or even higher secondary schools.

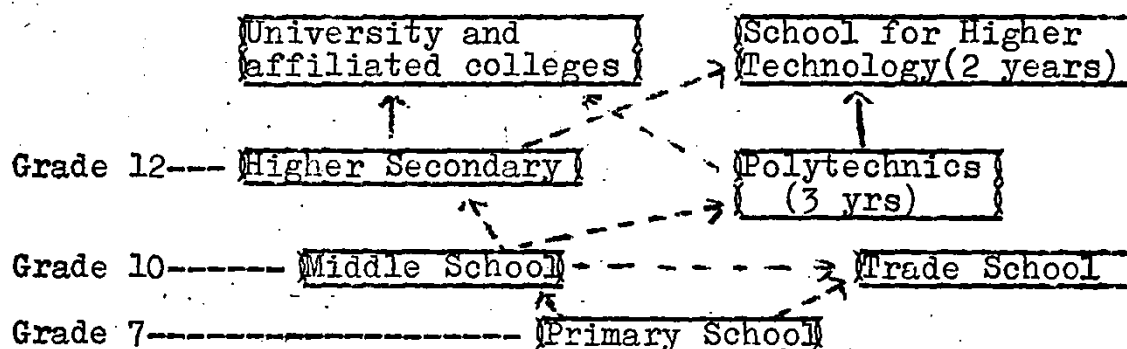
(6) Higher polytechnics or technical colleges should offer to the best technicians a 2 year course for higher technological specialisation. It is essential that this kind of training is very different by its content, its spirit, its teaching staff from the education of university engineers. Its quality should be looked for in doing well what it is intended to do, instead of trying to get a formal upgrading to degree courses.

(7) Training of teachers: It is obvious that the main teachers for the higher secondary schools and for the polytechnics, for the general subjects, and also for the technical subjects should have been trained in a real university and have got degrees. The training in the use of machine-tools and the teaching of design would have a real scientific value if such kind of teacher was provided. General universities and technical universities are not used

enough to provide good teachers for higher secondary or technical training.

- (8) The possibility of promotion from the skilled worker to the engineer qualification along the various steps envisaged here above should be the result of a particular organization for adult promotions; between the schools and the industry (correspondence and radio courses, part-time, day or block release).

The transfer of a student from the trade school to the polytechnics or from the polytechnics to the university should be quite the exception because of cost and difference of training.



(9) Organisation of guidance

The question of guidance for the students is of special interest, especially at the end of the middle school. It would be of help to envisage -

(a) The creation on a national basis, and also in each State, of a Bureau of Information and Statistics (BIS):

(b) The institution of a body of counsellors in guidance who would make the link between the BIS, the schools and the industry.

(10) Reform of the experimental training

Appropriate Working Groups might be envisaged to modernise the experimental training in Physics, mechanics and workshop practice. The American PSSC would be a good example for physics.

A particular interest might be given to the rethinking of the methodology of approach to the experimental sciences and to technology in the middle school: the French REMAIN method might be of some interest in that case. (The



Chamber of Commerce of Paris would certainly show its experience to any Indian visitor).

- (11) Something could possibly be undertaken to increase appreciation of professional activities; distinctions, travel etc. -- as has been done in several industrialized countries.
- (12) Though several solutions are giving good results, I would give preference, for the training of technician and higher technician, to a sandwich system, whenever possible.

**Educational Levels of Working Force  
in Japan. by Prof. S. Ihara,  
Member, Education Commission.**

In planning for engineering education, we have to take into full consideration the following factors:

- (i) number and location of schools;
- (ii) kind and level of schools;
- (iii) number of students;
- (iv) composition of curriculum (including experimental studies).

These factors are variable in each country according to its international situation, its stage of industrial development and its economic plan for the future.

Developing countries have a strong desire to attain rapid economic and social growth. Economic investment and educational investment are converging needs because they have to be solved within a limited framework of financial resources.

Due consideration of these factors becomes, therefore, the more important in these countries. Under a particular financial framework, an educational system must be well-balanced.

The problem of number and quality of graduates at each level must be correctly estimated in order to attain the maximum growth (which is the result of number multiplied by quality).

Here, the problem of quality presupposes the quality of teacher. A plan for the creation of a force of able teachers counts above all.

I have a favourable opinion of the new educational plan of the Republic of India, especially regarding extension of the years of compulsory education and establishing job training centres.

Under the particular condition of the educational investment in India, however, I think the scope of the educational fields in the new plan is too wide and the number of schools planned to be built is too many. On this point I would recommend to review the plan so as to maintain a proper priority order.

The man-power of industry in a nation is built with the graduates of various level of schools and various specialized educational fields. Viewed

from this standpoint, we find that the composition of a particular education system varies depending upon the number and kind of existing jobs in a particular nation.

Such being the case, we must build an educational system which can match the composition of existing or planned jobs. It is especially so in the case of the engineering education system. It must correspond with a certain stage of industrial development and the nature of industrialization plan.

However, a difficulty arises in that we can seldom have complete statistics of the composition of the educational backgrounds of all employees in industry. The data usually are lacking in the initial stage of industrialization, and besides, sectors of industry go through their ups and downs. So, we have to search the statistics in the examples of other countries, especially the example of a country having the similar situation or a country whose past performance is good. Taking my own country (Japan) as an illustration, I give below detailed statistics regarding the distribution of employees according to their educational background. These figures have been taken from the "Summary of Investigation of the Employees' Educational Background in Business Enterprises in Japan" prepared by the Ministry of Education of the Japanese Government in 1964. The numbers appearing in the investigation are 1963 and they represent the end result of a long history of Japanese industries. It will be appreciated that the percentages instead of the numbers in the investigation deserve greater attention and some arrangement should be made in order to match the situation in India in respect of the change in industrial structure, the flow of labour and the rate of growth of industry.

This investigation was undertaken in 1963-64 and the method followed is based on criteria: All business enterprises are classified according to

- a) industrial sector
- b) scale of enterprise
- c) privately owned enterprise
- d) government owned enterprise
- e) jointly owned enterprise.

Business enterprises include government offices.

The various expressions adopted in the statements are used in the following context:

1. Graduates of Elementary School: - Students coming out of

- (i) elementary school (of 6 years)
- (ii) middle school (new system: 3 years after 6 years of elementary)
- (iii) national school (old name for elementary school)
- (iv) higher course of elementary (old system: 2 years after 6 year elementary school)

Taken into consideration are:

- (i) Those persons who dropped out of these schools half way;
- (ii) Those persons who did not attend these schools;
- (iii) Students who dropped out of secondary school half way;
- (iv) Students now attending night course of high school.

2. Graduates of secondary school

Graduates of:-

- (i) high school (new system: 3 years night course included)
- (ii) Middle school (old system: 5 years; girls included)
- (iii) Vocational middle school (old system: 5 years)

Considered also are:

- (i) Students who dropped out of higher school half way.
- (ii) Students now attending night course of higher school.

3. Graduates of Higher School

Graduates of:

- (i) university and college (new system: 4 years  
old system: 3 years)

- (ii) higher school (old system: 3 years)
  - (iii) preparatory course of univ. (old system: 3 years)
  - (iv) vocational higher school (old system: 3 years)
  - (v) vocational course of univ. (old system: 3 years)
  - (vi) Teachers college (old system: 3 years)
  - (vii) Teacher's middle school (old system: 5 years)
  - (viii) short course college (new system: 2 years).
4. Administrative jobs: Jobs of administrative character above the position of section head (director, manager, department head, branch head, plant superintendent, section head).
5. Technician  
The employees engaged in technical jobs requiring a background of scientific knowledge and technical specially equal to or above graduate level of science department of univ. (including short course college).  
The employees performing the same technical jobs as the above-mentioned without diploma.
6. Skilled workers:- The employees having 7 years of experience after elementary school, high level of skill in a particular job, or engaged in jobs requiring a fairly good judgement and certain accountability.
7. Primary industry:- Agriculture and Fishery (Agriculture, Forestry, Hunting, Fishing, Sea Products)
8. Secondary industry:  
(i) Mining  
(ii) Construction.  
(iii) Metal and Machinery:- Iron, non-ferrous, Metal, Machine, Electrical apparatus, Transportation, Medical, Physical and chemical apparatus and tools, Optical, Watch making.  
(iv) Other industries: Food, Fibre, Garment, Lumber, Furniture, Pulp, Printing, Chemical, Oil, Coal, Rubber, Leather, Ceramic.

9. Tertiary industry:

- (i) Wholesale and retail
- (ii) Finance, Policy, Real estate
- (iii) Transportation, Communication, Public Utility
- (iv) Service
- (v) Public business.

The following points emerge from the investigation:

1. Total number of all employees in 1963 is 44,000,000. It was 37,000,000 in 1954.
2. The decrease both in the number and in the ratio of primary industry (excluding mining) is conspicuous.  
  
The increase of tertiary industry is not so great compared with that of secondary industry.
3. The change of the national income composition ratio of primary and secondary industries is also note-worthy.
4. The number of elementary school graduates decreased in every industrial sector from 1959.
5. The composition ratio of the graduates of law, economics, literature department is the highest throughout the sectors (excluding Agriculture, Fishery and Construction) and there appears a co-relationship between course of study and related sector, such as:

Engineering Dept. in Mining	--	39.1%
Engineering Dept. in Metal and Machinery	---	44.7%
Engineering Dept. in other industry	--	23.7%
Engineering Dept. in transportation and communication and public business	--	25.8%
Education Dept. in Service Industry	--	34.0
Agriculture and Fishery Dept. in Primary Industry	--	37.1%
Engineering Dept. in Construction	--	60-4%

Table I. Total Number and Percentage Distribution of Employees in Industry in Japan.

Industry	1963		Increase and Decrease of Percentage 1959-1963	Average Increase Rate of Employees per year 1959-1963	Percentage Distribution of National Income	
	Number (Unit: One thousand)	%			1963	1959-1963
All Industries	43,976	100.0	0	2.1	100.0	0
1. Agriculture, Forestry, Fishery (Primary Industry)	13,360	32.7	-6.6	-2.5	13.0	-3.5
2. Mining	457	1.0	-0.4	-4.6		
3. Construction	2,444	5.6	1.6	12.5		
4. Metal-working & Mechanical Industry	3,882	8.8	2.5	13.1		
5. Other Manufacturing Industry	6,171	14.0	0.9	4.0		
Sub-total (Secondary Industry)	12,953	29.5	4.7	7.2	39.3	3.5
6. Wholesale and Retail Trade	6,821	15.5	0.1	2.3		
7. Finance, Insurance & Immovables Business	1,047	2.4	0.6	11.1		
8. Transportation, Communication & Other Public Works	2,561	5.8	0.4	4.5		
9. Service	4,773	10.9	0.9	4.4		
10. Public Service	1,460	3.3	0.0	2.1		
Sub-total (Tertiary Industry)	16,663	37.8	1.9	3.6	48.2	0.1
Net Factor Income from Abroad					0.5	0.4

Table II: Distribution of Employees by Educational Background and Industry

a. Distribution by Educational Background

Industry	Percentage Distribution by Educational Background in 1963				Difference Between Percentages in 1959 and 1963		
	Total	Elementary School Graduates	Secondary School Graduates	University or College Graduates	Elementary School Graduates	Secondary School Graduates	University or College Graduates
(Unit: One thousand Persons)							
All Industries	43,976	29,023	11,688	3,265			
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
	100.0	66.0	26.6	7.4	-10.2	8.5	1.7
1. Agriculture, Forestry & Fishery	100.0	88.3	11.1	0.6	-2.3	2.3	0.0
2. Mining	100.0	76.7	17.1	6.2	-6.2	4.9	1.3
3. Construction	100.0	69.0	24.8	6.2	-13.3	11.2	2.1
4. Metal-working & Mechanical Industry	100.0	63.6	28.5	7.9	-10.0	9.4	0.5
5. Other Manufacturing Industry	100.0	71.4	23.2	5.4	-7.9	6.9	1.0
6. Wholesale and Retail Trade	100.0	52.0	43.0	5.0	-14.2	13.0	1.2
7. Finance, Insurance & Immovables Business	100.0	17.7	63.9	18.4	-7.5	10.3	-2.8
8. Traffic Correspondence & Public Works	100.0	58.9	33.6	7.5	-11.1	9.1	1.9
9. Service	100.0	37.2	33.5	29.3	-15.8	10.4	5.4
10. Public Service	100.0	28.2	55.4	16.4	-13.5	12.1	1.3



b. Distribution by Industry

Industry	Distribution by Industry in 1963			Difference between Percentages in 1959 and 1963			Average Increase Rate Per Year.		
	Ele.	Sec.	Univ. or Col.	Ele.	Sec.	Univ. or Col.	Ele.	Sec.	Univ. or Col.
All Industries	(Unit: One thousand Persons)								
	29,023	11,688	3,265						
	%	%	%	%	%	%	%	%	%
	100.0	100.0	100.0	0	0	0	-1.5	14.7	10.5
1. Agriculture, Forestry & Fishery	43.7	13.6	2.4	-2.1	-5.2	-1.7	-3.1	3.4	-4.6
2. Mining	1.2	0.7	0.9	-0.3	-0.2	-0.3	-6.1	3.6	0.7
3. Construction	5.8	5.2	4.6	0.3	1.1	0.8	6.5	43.3	32.0
4. Metal-working & Mechanical Industry	8.5	9.5	9.4	2.6	3.0	1.3	7.9	31.9	9.7
5. Other Manufacturing Industry	15.2	12.2	10.2	1.8	0.8	0.1	1.1	16.3	10.3
6. Wholesale and Retail Trade	12.2	25.1	10.5	-1.0	0.1	0.3	-3.6	14.1	11.1
7. Finance, Insurance & Immovables Business	0.7	5.7	5.9	0.0	0.5	-0.7	0.3	18.0	6.3
8. Transportation, Communication, & Other Public Works	5.2	7.4	5.9	-0.1	-0.4	0.2	-0.2	15.4	14.8
9. Service	6.1	13.7	42.9	-0.8	1.1	1.4	-4.3	17.7	11.1
10. Public Service	1.4	6.9	7.3	-0.4	-0.8	-1.4	-6.7	9.6	4.4

b. Distribution by Industry  
(1) Distribution in 1963

Industry	Total	General	Techni- cal	Commer- cial	Agri- cultural	Fishery	Domes- tic Arts	Others
I Number All Indus- tries (Unit: one thousand) %	11,688 100.0%	6,044 100.0%	1,326 100.0%	2,274 100.0%	1,231 100.0%	60 100.0%	495 100.0%	258 100.0%
1. Agricul- ture, Forestry & Fishery	13.6	8.3	1.5	3.0	60.1	33.2	43.3	11.8
2. Mining	0.7	0.6	1.6	0.7	0.4	0.2	0.1	0.8
3. Construction	5.2	4.1	19.1	2.8	2.1	1.0	1.0	3.5
4. Metal-working & Mechanical Industry	9.5	8.6	23.2	9.3	2.7	3.8	3.5	5.7
5. Other Manu- facturing Industry	12.2	11.9	20.4	12.3	6.5	22.8	9.3	9.0
6. Wholesale & Retail Trade	25.1	27.5	9.0	39.6	8.1	12.8	24.9	9.8
7. Finance, Insurance & Immovables Business	5.7	6.1	0.8	11.6	0.7	1.3	2.3	3.0
8. Transporta- tion, Commu- nication & Other Public Works	7.4	7.3	10.6	8.4	3.2	10.0	3.8	8.0
9. Service	13.7	17.8	7.8	7.5	6.7	7.3	10.2	41.4
10. Public Service	6.9	7.8	6.0	4.8	9.5	7.6	1.6	7.0

Table 4. Employment of University and College Graduates by Faculty and Industry.

a. Distribution by Course.

(1) Distribution in 1963

Industry	Total	Law, Lite- rature & Economics	Edu- cation	Sci- ence	Engi- neering	Agri- cul- ture	Medi- cine, Dentis- try & Phar- macy	Domes- tic Sci- ence & Others
Number (Unit: one thousand)	3,265	1,564	559	68	479	146	254	194
All Industries	100.0	47.9	17.1	2.1	14.7	4.5	7.8	5.9
1. Agriculture, Forestry & Fishery	100.0 (80)	15.1	32.0	0.6	6.4	37.1	1.4	7.4
2. Mining	100.0 (28)	48.4	1.4	4.0	39.1	0.8	4.9	1.4
3. Construction	100.0 (152)	35.3	0.3	0.3	60.4	1.8	0.1	1.8
4. Metal-working & Mechanical Industry	100.0 (307)	48.1	1.0	2.6	44.7	0.7	1.3	1.6
5. Other Manu- facturing Industry	100.0 (333)	54.2	1.8	3.3	23.7	7.9	5.5	3.6
6. Wholesale & Retail Trade	100.0 (342)	73.3	3.1	0.3	6.1	2.5	12.5	2.2
7. Finance, Insurance & Immovables Business	100.0 (193)	89.3	1.9	0.6	1.8	1.0	1.2	4.2
8. Transporta- tion, Communi- cation & Other Public Works	100.0 (192)	63.7	2.1	0.8	25.8	0.8	1.4	5.4
9. Service	100.0 (1,400)	34.6	34.0	2.8	4.0	3.1	12.2	9.3
10. Public Service	100.0 (239)	52.8	12.6	1.8	10.7	12.5	4.7	4.9
(2) Difference Between Percentages in 1959- and 1965.								
All Industry	0	0.5	- 1.1	-0.1	0.2	-0.2	-1.4	2.1
Primary Industry	0	-9.7	- 1.0	0.1	0.7	10.7	-0.3	-0.5
Secondary Industry	0	-0.3	0.4	0.2	1.2	- 0.1	-1.6	0.2
Tertiary Industry	0	0.4	- 0.4	-0.3	-1.4	-0.1	-1.4	3.2

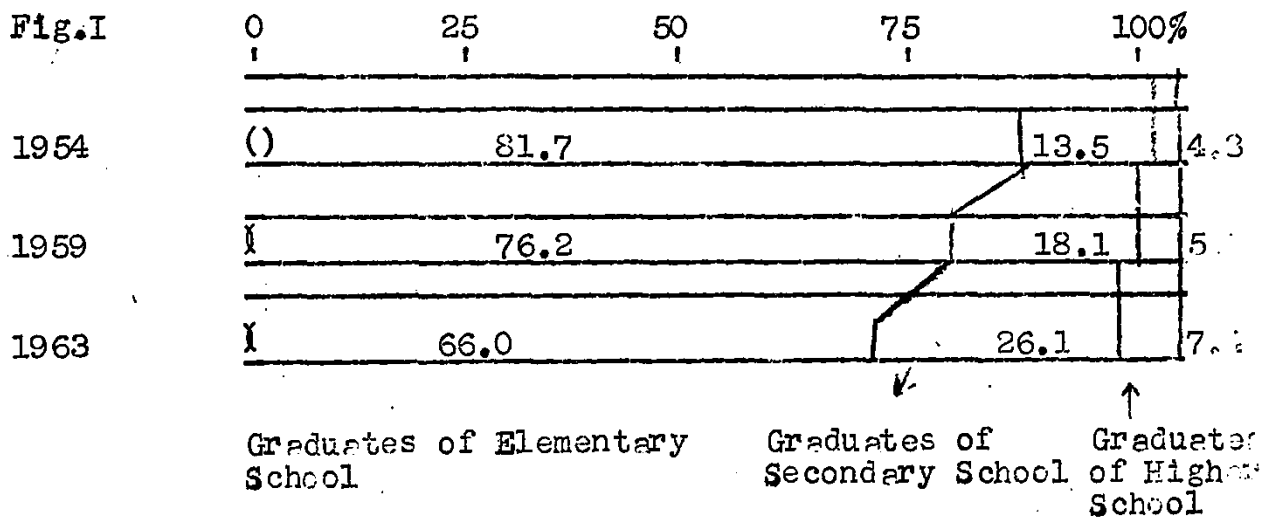
b. Distribution by Industry

(1) Distribution in 1963

Industry	Total	Law, Litera- ture & Econo- mics	Educa- tion	Science	Engi- nee- ring	Agri- cul- ture	Medi- cine, Dentis- try & Phar- macy	Domes- tic Science & Others
	Number 3,265	1,564	559	68	479	146	254	194
	(Unit: one thousand)							
All Industries	% 100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	%	%	%	%	%	%	%	%
1. Agriculture, Forestry & Fishery	2.4	0.8	4.5	0.7	1.1	20.0	0.4	3.0
2. Mining	0.9	0.9	0.1	1.6	2.3	0.2	0.5	0.2
3. Construction	4.6	3.4	0.1	0.7	19.1	1.9	0.1	1.4
4. Metal-working & Mechanical Industry	9.4	9.4	0.5	11.6	28.6	1.4	1.6	2.6
5. Other Manu- facturing industry	10.2	11.6	1.1	16.1	16.5	18.2	7.2	6.2
6. Wholesale & Retail Trade	10.5	16.0	1.9	1.3	4.4	5.8	16.8	3.9
7. Finance, Insurance & Immovables Business	5.9	11.0	0.6	1.7	0.7	1.3	0.9	4.2
8. Transportation, Communication & Other Public Works	5.9	7.8	0.7	2.3	10.3	1.1	1.1	5.3
9. Service	42.9	31.0	85.1	57.6	11.7	29.5	66.9	67.2
10. Public Service	7.3	8.1	5.4	6.4	5.3	20.4	4.5	6.0

(3) Average Increase Rate of Employees for Year Between 1959 and 1963

All Industries	10.5	10.8	8.5	9.0	10.8	9.1	5.0	31.8
Primary Industry	-4.5	-12.5	-2.3	0.0	-2.1	3.7	-8.7	-6.2
Secondary Industry	14.6	14.3	35.1	18.0	15.8	14.2	0.3	18.8
Tertiary Industry	10.1	10.4	9.4	6.3	4.1	9.6	5.7	38.4



Note: The percentage of Elementary and Secondary School graduates in 1954 is a statistically estimated figure.

Table 5: Employees by Type of Occupation and Educational Background

a. Distribution by Occupation

(1) Number and Percentages in 1963  
In thousands

Educa- tional Backgro- und	Total	Admi-	Tech-	Re	Pro-	Cleri-	Tech-	Ski-	Other	Sales	Other
		nist- ra- tion	no- lo- gy	sea- rch	fess- ional	cal	nical	illed	work		
		1	2	3	4	5	6	7	8	9	10
Total	43,980	1,170	950	210	1,370	5,910	2,490	3,870	20,750	5,540	1,710
Elemen- tary School Graduate	29,030	280	70	10	60	1,200	1,490	3,350	18,300	3,130	1,140
Second- ary School Gra- duate	11,690	460	540	90	260	3,780	950	520	2,370	2,190	530
Uni- versi- ty or College Gradua- te	3,270	430	340	110	1,050	930	60	10	80	220	40
Total	100.00%	2.7	2.1	0.5	3.1	13.4	5.7	8.8	47.2	12.6	3.9
Elemen- tary School Graduate	100.0%	1.0	0.2	0.1	0.2	4.1	5.1	11.5	63.1	10.8	3.9
Second- ary School Gradua- te	100.0%	4.0	4.6	0.8	2.2	32.3	0.1	4.4	20.3	18.7	4.6
Univer- sity or College Graduate	100.0%	13.2	10.5	3.3	32.2	28.6	1.7	0.2	2.3	6.8	1.2

B. Distribution by Educational Background

(1) Percentage in 1963

	Total	Admi- nist- ra- tion	Tech- nolo- gy	Re- sea- rch	Pro- fess- ional	Cleri- cal work	Tech- nicall Work	Ski- Work	Other La- bour	Sea- ries	Other Work
	%	%	%	%	%	%	%	%	%	%	%
Elementary School Graduate	66.0	23.5	7.2	6.6	4.5	20.3	59.8	86.5	88.2	56.5	66.5
Secun- dary School Graduate	26.6	39.6	56.6	43.3	19.0	63.9	38.0	13.3	11.4	39.5	31.3
Univer- sity or College Graduate	7.4	36.9	36.2	50.1	76.5	15.8	2.2	0.2	0.4	4.0	2.2

(2) Difference Between Percentages in 1959 and 1963

Total	0	0	0	0	0	0	0	0	0	0	0
Elementary School Graduate	-10.2	-8.2	-3.7	-1.5	-3.2	-8.6	4.8	-4.5	-3.5	-11.4	-14.3
Secondary School Graduate	8.5	7.0	2.8	4.2	2.3	8.2	5.3	4.5	3.4	10.5	13.5
Univer- sity or College Graduate	1.7	1.2	0.9	-2.7	0.9	0.4	-0.5	0	0.1	0.9	0.8

b. Distribution by Faculty

	Total	Admi- nist- ra- tion	Cle- ri- cal work	Tech- nolo- gy	Rese- arch	Profe- ssional	Tech- nical	Ski- lled work	Other la- bour	Sales	Other work
	%	%	%	%	%	%	%	%	%	%	%
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1. Law, Litera- ture and Economics	47.9	67.0	76.5	3.8	15.0	29.7	15.1	24.0	27.6	74.7	59.5
2. Education	17.1	5.5	8.4	1.2	4.6	39.3	4.8	3.9	31.9	2.1	6.8
3. Science	2.1	1.2	0.7	5.2	13.1	2.2	1.5	1.5	0.5	0.2	0.2
4. Engineering	14.7	15.3	4.2	74.7	29.9	3.4	49.9	44.1	4.7	5.8	4.7
5. Agriculture	4.5	5.1	3.3	7.8	15.0	2.0	11.6	12.2	20.8	3.1	0.5
6. Medicine, Dentistry and Pharmacy	7.8	4.1	0.6	5.8	21.4	16.1	1.6	0.3	1.7	7.1	2.3
7. Domestic Science and Others	5.9	1.8	6.3	1.5	2.0	7.8	15.5	14.0	12.8	7.0	26.0



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III  
SEMINAR

REPORT OF THE SEMINAR ON TECHNICAL EDUCATION

Introduction

1.1 A seminar on technical education, organised jointly by the Education Commission and the Association of the Principals of Technical Institutions (India) was held on 15th, 16th and 17th October, 1965 in the premises of the Indian Institute of Technology, Delhi. 73 delegates representing various technical institutions - both at degree and Diploma levels - and other organisations participated in the discussions. (List of participants is given at Annexure I).

1.2 The seminar was formally inaugurated by Shri L.N. Dogra, Director, Indian Institute of Technology. Thereafter, discussions on different aspects of Technical Education were held in six separate sessions, each session covering a specific field of Technical Education. The subjects so covered, together with the names of the educationists who chaired the different sessions are given below:-

	<u>Aspects of Technical Education Covered</u>	<u>Chairmen</u>
Session No.1	General, Primary and Secondary education leading to technical education.	Prof. S.C.Sen, Principal, College of Engineering, Delhi.
Session No.2	Training of skilled workers and craftsmen.	Shri R.A. Shenoi, TISCO, Jamshedpur.
Session No.3	Polytechnic education	Shri G.K. Chandiramani, Additional Secretary, Ministry of Education.

Session No.4	Degree education	Prof. V. Lakshmi Narain, Director, Birla Institute of Technology, Pilani.
Session No.5	Post-Graduate Education.	Prof. S.K. Bose, Director, I.I.T., Bombay.
Session No.6	General Administration, Examinations.	Shri L.S. Chandrakant, Joint Educational Adviser, Ministry of Education.

1.3 In order to ensure that the discussions were confined to the specific issues under consideration and thus were more purposeful, each session framed for itself a detailed questionnaire, covering the particular aspect of technical education assigned to it. The details of this questionnaire together with the main points made during the discussion are given below, separately for each session.

2) SESSION 1. Detailed Discussions:-

15th October,  
1965  
Forenoon.

2.1 Broad field of Technical Education considered:- General Primary and Secondary education leading to technical education.

2.2 Specific issues discussed

- (a) What is the purpose and aim of technical education?
- (b) Levels at which technical education has to be imparted.
- (c) Medium of instruction at different levels of technical education.
- (d) Co-ordination between general education, science education and technical education at different levels.
- (e) At what stages of general education should students be diverted to vocational, technical and professional education, and what form should such education take at each stage.

- (f) should a junior college course following ten years school education be a pre-requisite for entry into professional education?

Points made at the discussions which followed:-

2.3 The aim of Technical Education is primarily to equip the Engineer adequately to fulfil his professional and social obligations. As a member of the society, he is to strive constantly for its betterment. In this age of explosion of scientific knowledge, he is to bring in the latest technical knowledge for the continual improvement of man's material environments. His technical responsibilities impinge very much on his social obligations. Besides technical competence of highest order, he must therefore possess a sensitivity to his environment and a large measure of initiative and leadership in society. A correct sense of values and a quest for new knowledge should be developed. For this purpose, a carefully-developed and coordinated curriculum is necessary.

2.4 While the aim of giving a minimum education for all persons up to matriculation, involving 10 years schooling, is desirable in itself, it is decidedly difficult of achievement in the foreseeable future. It is so costly that especially a country like ours, at this stage of economic development, cannot afford it. Further, it has been our experience that majority of the students going up to the matriculation level proceed to the university resulting in a tremendous pressure on colleges. Effective diversification of

courses after class VIII, providing suitable opportunities for such persons as do not possess aptitude for higher education is essential for relieving this pressure.

2.5 According to a number of speakers, delaying the diversification of education till after class X has the effect of making the education too long for terminal courses thus putting it out of reach for many. If adequate safeguards are provided for switch-over to other streams at a later stage, as called for in the case of late developers, there should be no serious disadvantage in having diversification after class VII/VIII. The consensus of opinion in this session, appeared to be in favour of a common course of general education up to standard VII/VIII for all students and to have diversification at that stage. Students desirous of studying for engineering as a profession could join high schools with science and mathematics as a preparation for such a course.

2.6 For the less meritorious who are unable to pursue high school education, institutional courses in technical schools leading to vocational training in trades along with further general education up to the matriculation standard would be necessary. The period of this training may extend over three or four years. At this end of this course, there should be provision for the late developers joining the polytechnics for technician's course at a suitable level. However, majority would seek employment in the industries as craftsmen.

2.7 Similarly, students lacking scholastic ability for pursuing general education may be diverted to I.T.Is. for being trained as craftsmen. However, this should not be the only channel for craftsmen training except for certain trades such as electronics, instrumentation, etc. It was the general view that the other avenue for craftsmen training i.e. through technical schools should also be retained. Lacunae in existing Technical Higher Schools/JTs should be removed after a careful and dispassionate study.

2.8 For the dropouts after primary education due to, inter-alia, financial reasons, proper arrangements for vocational training should be made in industry under the Apprenticeship Act schemes. Their further educational development will have to be looked after by providing facilities for part-time training, covering a wide range of courses suited to local needs. Duration of this training could be flexible depending upon the course.

2.9 In basic general education, course up to the VIII standard should have science content, for, in this age of science and technology, teaching of science is a must for all educated people. Under no circumstances, should it be delayed beyond the primary stage. If possible, students should be introduced to science through nature even before that stage.

2.10 Work experience as an integral part of all education is an effective educational tool and useful in character building. Introduction of this work experience should be gradual, suited to the age and maturity of children. It should be appreciated that children at elementary stage cannot pick up any craft smills and nor is it desirable for them to attempt to do so. This should be left over to a higher age group.

2.11 Up to 8th class, the instruction should profitably be organised in local or regional languages. It is advantageous to introduce English as a second language, preferably soon after primary level. In higher technical institutions, medium of instruction should continue to be English. Inadequate power of comprehension and of expression decidedly results in a lower standard of trained technical manpower especially at higher levels. At lower levels, however, such as craftsmen training, regional language should be adopted as media of instruction. Experiments should also be made to impart education at the technicians levels in these regional languages. Concerted efforts should be made to develop regional languages and to evolve adequate technical vocabulary.

2.12 Any pattern of education with built-in flexibility of change-over at various stages naturally calls for vocational guidance at every stage. This has to be arranged in collaboration with industry and other concerned authorities.

3) SESSION II 3.1 Broad field of Technical Education covered:-

15th Oct. '65

Afternoon Training of skilled workers and craftsmen.

3.2 Specific issues discussed:

- (a) What should vocational education attempt to do?
- (b) What are the weaknesses of the existing system of training for industries through the Industrial Training Institutes, or the Apprenticeship Act?
- (c) What level of skill should be imparted to the trainees and what would be the duration of training at each level?
- (d) What form of on-the-job training should be developed to provide training for the unskilled, semi-skilled and skilled worker?

- (e) What sort of facilities should be provided for the workers to improve their skills and education to enable them to improve their prospects.

Views offered at the discussions

3.3 The objective of vocational education should be to impart to those who wish to join industry, sufficient ability, judgement and manipulating skills in a trade. The skilled craftsmen play an important part in the industrial development of a country and their training on right lines should be given due priority.

3.4 I.T.Is have made a substantial contribution towards the training of skilled craftsmen. However, these institutes lack built-in strength. The duration of 18 months appears inadequate to provide a strong basis of trade skills. According to some delegates, it will be desirable to extend this duration to two years, in certain trades, supplemented with 6-12 months of on-the-job training. Instructors of higher calibre, better equipment and greater content of general education in science and social studies are essential pre-requisites. The belief held in some quarters that vocational training and intellectual development cannot go hand in hand no longer holds good. A balanced blend up to matriculation standard with a strong orientation towards development of trade skills is necessary to produce good skilled craftsmen. This general education up to matriculation standard is necessary for providing suitable avenues for craftsmen to increase their professional competence by proper part-time courses while at work.

3.5 There should be better liaison between the I.T.Is and Industrial Instructors of the Apprenticeship Scheme.

3.6 Under the Apprenticeship Act, regional apprenticeship authorities are established with powers to adjust the courses to match supply with demand. Courses could be shortened, at their judicious discretion to meet the demand or could even be lengthened to improve quality.



3.7 The Central Training Institutes for the training of craft instructors for I.T.Is are also doing a fine job but suffer from an inherent defect of depending on the I.T.Is themselves for the Instructor-trainees.

3.8 It should be appreciated that any amount of institutional training cannot produce a skilled worker/technician who can straightaway assume independent charge of production on the shop-floor. A certain amount of on-the-job training is very necessary in all cases. Industry should accept this responsibility and provide reasonable facilities.

3.9 Apprenticeship Act of 1961 is a major step to ensure the fulfilment of Industry's responsibility in the training of skilled craftsmen. However, items such as, schedule of work-processes, organised instructions in the trade and related subjects and proper supervision of on-the-job training still need attention. Periodic progressive evaluation of the apprentice's progress on systematic lines is necessary. The duration of training needs to be adjusted to the previous preparedness and the nature of that trade.

3.10 Very few industries in the country are today in a position to provide organised training of this type. Established firms like Guest Keen Williams, TISCO etc. are exceptions. (At this stage, the training programme as organised by TISCO was explained in detail by the Chairman). All enterprises, big or small, should appreciate that it is in their own interest for taking timely steps to train craftsmen to meet their requirements. A way out of this situation would be to organise such facilities on a cooperative basis by the larger units. Even smaller units by pooling their resources can provide reasonably good training facilities. The State should extend all assistance in this regard.

3.11 In order to improve quality of such training, there is need to form joint management-labour apprenticeship committees to draw up training programmes and to ensure effective implementation. Skilled craftsmen trainees should be placed under the charge of master craftsmen and semi-skilled craftsmen should be trained by skilled workers.

3.12 While I.T.Is are doing good work, the technical schools should also be developed to provide an alternative route for the training of craftsmen. If technical schools have not so far produced the desired results, the fault lies in implementation and lack of clear definition of the objectives which should be different from those of general high schools.

3.13 A progressive policy of vocational education calls for adequate motivation to the skilled workers in the form of part-time/sandwich technicians' courses at the diploma level and also by encouraging

them to pass examinations of a type similar to those held by London City and Guilds Institute. The industry must agree to release workers to enable them to attend such part-time courses.

3.14 In view of the rapid technological developments, it should be ensured that the training imparted creates appropriate attitudes towards skills to make the changeover easier.

3.15 The ratio of engineers to technicians and skilled workers as it obtains today in the country is not a happy one. Under-utilisation of engineers and technicians should be avoided. Under stable conditions, a ratio of 1:4:7 (or 10) would present a balanced development.

3.16 There is today a diversified control over vocational training programmes which are scattered over a number of Ministries/organisations. In the States, while craftsmen training programmes are looked after by State Boards of Vocational Education, the technicians training schemes are administered by State Boards of Technical Education. Effective coordination between them is very essential. Similarly, there should be better coordination between the programmes of primary and secondary schools.

) SESSION III

16.10.65  
Forenoon

4.1 Broad field of Technical Education : Polytechnic Education

4.2 Specific Issues discussed:

- (a) What should be the different in education and training of a technician as compared with the skilled worker on one hand and the engineer on the other?
- (b) Should polytechnic courses be narrowly specialised and job-oriented? If so, what sort of practical orientation would you suggest - by sandwich courses or by giving supervised on-the-job training after the Institutional training?
- (c) What should be the duration of the sandwich and on-job training?
- (d) What role should industry play in organising the sandwich courses and giving the practical training?
- (e) How much General Education should be included in technicians' training? Should any courses on industrial psychology and labour management be included?

- (f) What is the place of part-time courses and correspondence courses in the training of technicians? What should be the duration of part-time courses and how can arrangements for practical laboratory work be organised for such courses?
- (g) What is your assessment of equipment position in respect of polytechnic education, and what measures do you suggest for overcoming the difficulties?

Important Views Expressed:

4.3 The technicians form the intermediate level between the engineer and the skilled craftsmen and should be able to appreciate both the scientific basis of the job and also have a good grasp of the shop-floor techniques. The institutional training must adequately equip them to do their task without an unnecessarily long period of training. The system should provide enough avenues to competent persons to go to the top.

4.4 There is considerable validity in the complaint that the Diploma courses followed in polytechnics are a diluted version of the degree courses. The syllabus should be carefully recast providing for more practical training. It should be kept in view that most of the students come up to the required mark. The practice, therefore, of catering for the backward students should be discontinued.

4.5 Sandwich courses yield best results at polytechnic level and should, therefore, be tried wherever facilities exist. Good liaison with industry necessary for this purpose can be ensured by the formation of Advisory and Development Councils in each area.

4.6 At present, the courses in polytechnics confine themselves mostly to the three main engineering disciplines, that is Civil, Electrical and Mechanical. They need to be diversified to include specified areas, such as metallurgy, electronics, instrumentation, specific branches of mechanical engineering and textile technology. Further, courses such as secretarial, commercial and agricultural should also come under the purview of polytechnics to make them real centres of vocational education.

4.7 Narrow specification in polytechnical training is not desirable, as that would lead to difficulties in the proper fit-in of the trained persons, especially in view of the present stage of industrialisation in the country. It would be adequate

if only enough general training and principles are covered in these courses. Further specialisation may be left to industries concerned.

4.8 Job-oriented courses would be a success only if industry sponsors the students.

4.9 Minimum academic qualifications for admission to polytechnics should be matriculation and the duration of training should continue to be three years. Courses in polytechnics should also include such objects as industrial psychology and labour management. As a rough guide it may be suggested that allocation of time may be 25% for basic sciences, 25 to 50% for non-technical subjects and 50 to 60% to technical subjects.

4.10 Polytechnics should run part-time Diploma courses for craftsmen employed in industry. It should be kept in view that filling up of middle level supervisory posts is not always institution-based. These are occupied by quite many craftsmen coming up. Such part-time courses are necessary to provide avenues to rise to highest position.

4.11 Many of the polytechnics are under-staffed. Besides increasing the pay scales, competent persons from industry should be attracted as teachers. Quite often, industry cannot spare its staff to do teaching on a part-time basis in view of its own shortage of staff. Teachers from institutions should, therefore, be allowed to go to industry periodically for practical experience. This would indirectly help the industry to bring in a new approach in its production techniques. Necessary facilities in this regard should be created.

4.12 Adequate teacher training institutes would help in improving the quality of polytechnic teachers. Short-term courses, summer schools for teaching techniques and part-time advance courses of specialised industry are other steps.

4.13 Correspondence courses though useful both at the polytechnic and degree level call for very careful planning and should be started only in the institutions having adequate facilities in the form of competent faculty.

4.14 In view of the shortage of foreign exchange a judicious selection of equipment for polytechnics is necessary. Sophisticated equipment at this level would have very little educational value. As far as possible, the equipment for instruction in polytechnics should be of indigenous make. A schedule of experiments should be devised accordingly. Indigenous production of this equipment is possible to a very large extent even under the present situation. It should be

ensured that no equipment lies idle in any institution.

4.15 For their practical training, the polytechnic students should be put on jobs which are complete and saleable. That would give them considerable self-confidence. As an alternative, wherever possible, pilot projects within industry to give necessary training to the students should be started.

4.16 Before starting new polytechnics, existing ones should be carefully strengthened and expanded.

4.17 Manpower forecasts at technician level should be carefully done to avoid under-utilisation.

4.18 Technicians should be given due social status by improving the conditions of service.

4.19 Many diploma holders take up AMIE examinations soon after passing out of polytechnics. A minimum period of practical training should be insisted upon as an essential admission qualification to enable the students to get enough industrial experience.

4.20 Study of humanities is equally essential in polytechnics. At the same time, a strong enough science content is also necessary to enable the student to understand the design aspects and adjust himself to changing industrial techniques.

5) SESSION NO. IV  
14.10.65  
Afternoon

5.1 Degree Education

5.2 Specific issues considered:

- (a) What types of engineers are needed by our country?
- (b) What should be the main preparation for admission to an engineering course?
- (c) It is accepted that two types of engineers are needed, one for supervision, development and management, and the other for Design, Research and Teaching; What should be the duration of these courses?
- (d) Should there be two different types of courses or should there be a common course with bifurcation at an appropriate level through electives or otherwise by selection?

- (e) What part should practical training play in the training of an engineer and how should it be organised?
- (f) Do sandwich courses have any place in the training of an engineer? If so, what role should industry play in the organisation of such courses and the practical training in general of an engineer?
- (g) What part should part-time courses and correspondence courses play in the education and training of an engineer? Where should these be located and what in your opinion are the facilities needed for them?
- (h) What are the problems in relation to laboratory equipment for training of an engineering graduate?

The following were the important points which emerged at the discussion:-

5.3 It should be remembered that the Engineers coming out of our institutions today will be active members of the profession for the next four decades. They should, therefore, have the necessary scientific preparation to adapt themselves to the rapid technological changes that are taking place today and that will continue at a much faster pace hereafter. It is necessary therefore, that fundamental sciences should be given greater predominance in their curriculum.

5.4 The functions performed by graduate engineers may be categorised follows :

- (a) Supervision of Engineering process.
- (b) Maintenance and operation of engineering devices and system.
- (c) Design and production of engineering devices.
- (d) Development of new devices and systems.
- (e) Teaching of engineering science, technology and research.
- (f) Engineering administration.

The first two of these items could conveniently be transferred to Diploma holders, so that the training given to Engineers could be put greater use.

5.5 The suggestion that there should be two streams of engineers, one for production and maintenance and the other for design and research, evoked a very lively discussion. Arguments were offered both in favour and against the proposal. The consensus, appeared to be against having two separate streams of engineers. However, suitable electives should be provided in the latter stages of the courses.

5.6 Abrupt changes in the courses offered in different institutions would result in confusion. The different institutions should be allowed to open as many streams as considered best by them. By a nature process of selection, the older courses not keeping pace with the times would wither away.

5.7 Even more subjects may be taught with different approaches. Full academic freedom should be allowed to the institutions. However, broadly speaking, this core should consist of Basic Sciences, Mathematics, Humanities and fundamentals of Engineering.

5.8 Greater emphasis on the study of humanities and social sciences is necessary to enable engineering graduates to meet their social obligations.

5.9 The duration of first degree course in engineering and the minimum academic qualifications for admission formed another issue on which two schools of thought were presented. A few delegates strongly felt that the recently introduced five year integrated courses after eleven years of schooling, should be made the pattern for the whole country and that the higher secondary system had not been given a fair trial. In reply, a few others contended that the conversion of high schools to higher secondary schools was not successful and therefore had not been given effect to in most States. They therefore, advocated the introduction of classes XI and XII (which may be attached either to the school stage or university stage) to provide adequate preparation to the students for joining engineering colleges. With this system, the duration of first degree course would be four years. This view further gained support from the experience of most of the engineering colleges running five-year integrated courses viz. that the educational attainment at 16 plus (i.e. after Higher Secondary) was not adequate for a student starting upon a professional engineering course.

5.10 A note of caution was however sounded against the possibility of these classes XI and XII being run on the same lines as the former Intermediate colleges. This should be guarded against by ensuring that standards XI and XII do not have a separate

identity. Wherever higher secondary school system is running successfully these classes could be attached to the school stage and at other places, they may form a sub-wing of the university.

5.11 Whatever pattern is adopted, it should be ensured that the total period of education leading to the first engineering degree should not be less than 16 years.

5.12 Practical training so essential in the education of engineers could be in the form of one year of intensive training at the end of the first degree or could be interspersed with the total period of five to six years of education. As the university does not examine the standard of attainment therein, this practical training is rarely taken seriously. Possibilities of giving this training in laboratory practices should be considered. There should be a close liaison between the teaching group at the college and the personnel in the industry supervising practical training of the students.

5.13 To develop further collaboration between engineering colleges and industry a beginning should be made with the introduction of cooperative sandwich courses. The courses in the engineering colleges should be oriented towards industrial needs though specialisation to meet the needs of any particular industry is not desirable. The experiment being tried at Maulana Azad College of Engineering at Bhopal in sandwich courses should be carefully watched for adoption elsewhere.

5.14 Part-time and correspondence courses for the first degree level should be encouraged, reserving the correspondence courses only to institutions with good staff and laboratory facilities. Candidates taking correspondence courses should be required to do practical work in the laboratories of institutions at some period of their training. This is a highly specialised field and utmost caution in embarking on it is necessary.

5.15 Laboratory instruction in the engineering colleges is often out of date and is not conducive to develop in the students the faculty of observation and analysis. The whole spectrum of laboratory of laboratory education, its objectives and techniques and also the question of manufacture of indigenous scientific equipment should be carefully gone into.



5.16 Shortage of laboratory equipment would call for the following measures:-

- (a) Instead of starting new institutions in the near future, concerted effort on fully equipping existing institutions should be made.
- (b) Existing equipment in the colleges could be put to better use by working in shifts.
- (c) Design and manufacture of equipment should be undertaken by better equipped institutions, if necessary, in collaboration with industry. This will create great self-confidence in our institutions. Wherever practicable, the institutions should be compelled to fabricate their own equipment. Necessary facilities and enough incentives should be offered.

5.17 Standardisation of engineering curricula has provided too little opportunities for outstanding students with creative talents to develop their capacity to the maximum, as most of the under-graduate courses are designed to proceed at a rate that can be followed by the average student. This lack of challenge for the gifted student results in a waste of national manpower resources. Efforts to break through this situation, according to some delegates, should take the form of a special programme of instruction for the top 10% of a good class.

5.18 According to a few, the apprehension that there is over production of Engineers is baseless. They argue that many sectors such as teaching, research, development and design and agriculture are not adequately covered. What is urgently needed is a careful and selective development of the different courses of study.

5.19 Refresher/orientation courses/summer schools should be held more frequently.

6. SESSION NO.V  
17.10.65  
Forenoon

- 6.1 Broad fields of Technical Education covered Post-Graduate Education.
- 6.2 Specific issues discussed

- (a) What is the role of post-graduate education in the training of an engineer?
- (b) What type of post-graduate courses are needed to prepare engineering graduates for the industry, research and teaching?
- (c) What role should industry and Govt. departments play in the organisation of post-graduate courses and research in the institutions?
- (d) How could post-graduate departments help in the Design and development work in the Industry and Government departments with a view to vitalising their research and post-graduate activity?
- (e) What form should collaboration between the Research Departments of the Universities and the National Laboratories take in view of the Scientific Policy Resolution of the Government?
- (f) How can interdisciplinary approach be encouraged in post-graduate Education?

6.3 On the basis of Thakar Committee's recommendations, a two year pattern of post-graduate engineering education at master's level has already emerged. The response to these courses has not been very encouraging. It is felt that there should be some flexibility in organising Master's degree programmes of study so that they could be developed according to the genius of the concerned institutions. Some institutions have already started one year post-graduate diploma courses, to meet the short-term requirements of industry and Government organisations. However, it is too early to warrant a change of pattern at this stage.

6.4 There is need for the introduction of Doctorate degrees in Engineering permitting specialisation in professional subjects as is prevalent in some European countries. This is necessary as a very large proportion of engineers are engaged outside the fields of teaching and research on professional work which requires an equally high intellectual level of development which should be recognised and rewarded.

6.5 Suitable incentives to post-graduate students in the form of more attractive fellowships during training and higher starting salary at the time of recruitment on completion of the course are necessary to intensify post-graduate studies at the engineering institutions.

6.6 The institutions organising post-graduate studies are also to be permitted to offer courses on part-time basis for serving engineers in the industry where such efforts are likely to receive a good response from junior engineers. But such part-time courses at post-graduate level should be conducted only by a faculty of the highest order.

6.7 Sandwich courses at post-graduate level could be tried for specialised fields of study - such as Dock and Harbour Engineering. One difficulty often experienced is that persons from industry who can spare time for lectures are not easily found.

6.8 Better liaison between research laboratories, industry and technical institutions should be developed. Frequent visits of research scientists and industrial experts to the universities and internal programmes for the exchange of professors among universities and institutes of technology would be very helpful for generating proper intellectual atmosphere.

6.9 There should also be better collaboration among the engineering institutions themselves. One way of this would be to allow different institutions to exchange teachers for a period of one to two years.

6.10 Not all the National Laboratories are conducting Post-Graduate courses, though facilities exist. These institutions should be encouraged to conduct such courses at least for their own research. Care should be taken to avoid duplication.

6.11 Duration of post-Graduate studies largely depends on the purpose in view. While for producing a good research worker or teacher, even a duration of two years may be too short, this period is too long for others who just want a Diploma as an additional qualification only. Similarly, if it is an industry-oriented study, the duration has to be as short as possible to be of benefit to the industry.

6.12 Inter-disciplinary approach should be taken in hand even at under-graduate stage, if it has to be of any immediate use at post-graduate stage.

6.13 Post-Graduate courses should be started only in institutions with a very good faculty. Utmost care should, therefore, be exercised in the selection of faculty members. At present, many institutions are found to start these courses as a matter of prestige.

Another school of thought in this connection is that if post-graduate courses, are allowed in all institutions, the general standard will go up as a result of competition.

6.14 Authorities in charge of administration should realise that all research projects cannot necessarily be successful or rewarding. Before large projects of engineering research are possible, many efforts at trial and error are inevitable.

## 7. SESSION VI

17.10.65

Afternoon

### 7.1 Specific Issues discussed:

(a) What steps would you suggest should be taken for improving standards of technical education in the country.

- i) Administration of Technical Institutions.
- ii) Text Books.
- iii) Teaching method and aids.
- iv) Accreditation and statistical evaluation of all aspects of technical education.

(b) What should be our method of assessment of the students in different types and levels of courses -

- i) Frequency of examination
- ii) Internal assessment
- iii) System of grading etc.

What reforms would you suggest in our system of examinations?

(c) What are your suggestions for faculty development as the basis for improving standards in technical education?

(d) What are the shortcomings by way of facilities in technical education

institutions -

- i) Teaching facilities (including libraries)
  - ii) Facilities for staff members.
  - iii) Facilities for students and their welfare.
- (e) What do you consider the best and most feasible method of selection of students for Diploma and Degree level courses?
- (f) What are your suggestions for obtaining closer collaboration of the industry with technical education at the Institute, State and Central Government level?
- (g) What measures would you suggest to ensure recruitment and retention of capable teaching staff in technical institutions? What steps can be taken to train teachers effectively and expeditiously?

Points made:

7.2 Among the various factors which account for the determination of standards, the quality and character of the faculty are of controlling importance. Necessary atmosphere for the growth of faculty could be created if the college administration gives discriminating attention to the important problem of recruitment, selection, training and advancement of the staff members. Intellectual growth should be recognised and encouraged. Teaching loads must be kept at reasonable level to allow time for scholarly and creative activities. Facilities for performing creative work will have to be provided. A policy of progressive faculty development will pay dividend in the longer run.

7.3 For recruitment and retention of qualified personnel, establishment of suitable salary scales comparable to the income earned by outstanding professional engineers is necessary. It is obvious that all institutions cannot provide this. Such institutions could at least provide such prerequisites as, facilities for education of children, comfortable living conditions etc..

7.4 Younger members of the faculty should be put under the care of competent persons for their training. Steps like seminars, discussion groups, formal and informal conferences between the experienced and fresh teachers will have a great effect on the training. In education, formal courses of teacher training, together with short-term activities in summer schools and other specialised courses are equally important. They must become a regular feature of our academic life.

7.5 Staff members of engineering colleges should be allowed private consultancy. This consultation promotes close association between institution and industry, thus stimulating the teacher to improve his teaching. It is also a source of ideas for research. This should, however, not be allowed to stand in the way of faculty member's primary responsibility as a teacher. Adequate safeguards against such an eventuality could always be devised.

7.6 An incentive scheme for faculty development providing merit promotion and advance increments for meritorious work would be a useful mechanism for faculty development. The present pyramidal staff structure does not help in encouraging young engineering graduates to join the teaching profession as they have no prospects of advancement. This staff structure should suitably be revised providing for greater opportunities of higher posts. Preferably, the structure should be cylindrical.

7.7 Proper academic atmosphere by allowing the staff freedom of experimentation and creating in them a sense of participation in taking policy decisions is necessary. Adequate leisure for creative pursuits by reducing teaching hours and recognition of meritorious work are equally important. The exchange of staff within and between institutions will also contribute towards faculty development.

7.8 Curricula development in the light of the technology explosion taking place almost everyday comes next to importance. The students are to be given a sound grounding in the fundamentals of science and mathematics. This question of curricula development will have to be carefully gone into by competent persons and faculties concerned should be involved. There are a few unfortunate instances of universities hesitating to recast the syllabus because of student pressure.

7.9 Admission of engineering colleges should be streamlined to allow full freedom in all academic and relevant administrative matters. Most of the engineering colleges in the country form a part of the faculty of technology in the universities and do not enjoy any measure of autonomy in academic or administrative matters. Very often, the representation for engineering faculty on academic councils is too low. As a result, engineering education has become undynamic and rigid without any attitude for experimentation especially in fields such as the system of examinations and syllabi. Very often, academic matters are decided by non-technical people.

7.10 Direction of technical education should be in the hands of educationists. Greater executive and financial powers are to be delegated to union. This

should be done without any delay.

7.11 Effective collaboration between industry and institution can never be over-emphasized. State Boards of Technical Education should ensure this by providing for adequate representation of industry at all regional and State level bodies connected with Technical Education.

7.12 Examinations besides assessing the performance of the student should act as an indication of the usefulness of the syllabus and success of the courses. With its present rigid system, this is not possible. External examinations do not allow the freedom to the teachers to experiment with syllabi and also the teaching method. Such examinations are out-dated. The teaching faculty should have full control over the examinations to be conducted by them. All examinations should be internal as far as possible.

7.13 To ensure a continuous assessment of the student throughout the course, semester system of examination appears most suitable. Grading should be on the basis of average examination standards and not according to present practice in some institutions of lowering the examination standards to the level of the weakest student.

7.14 According to a few members, system of supplementary examinations would be very useful, especially in bringing down the rate of wastage. Such a system would be preferable to the semester practice.

7.15 Judicious and careful selection of students for undertaking the degree courses is essential. Under the present circumstances, admission through competitive examinations appears to be the most feasible method. However, as standards differ from region to region, steps should be taken to standardise our system of secondary education. A system of regional examinations for admission to engineering colleges would also be desirable till such standardisation of secondary education is done.

7.16 Indigenous textbooks in engineering subjects are very few. The textbooks by foreign authors used in our institutions are too expensive. The question of production of suitable textbooks in regional languages should be given a serious thought. A central organisation charged with the responsibility of the production of cheap textbooks appears to be correct step to remedy the situation. The usefulness of new books so evolved should be established by trying them in the class room in some selected institutions for a period of time. Care should be exercised to avoid cheap textbooks.

- 7.17 Technical Education at all levels should be under the same Ministry/Department. The present system of diversification of administrative control over a number of Departments leads to ineffective coordination.
- 7.18 A suggestion was also made that to ensure that the teachers are always on the alert and keen to improve their own standard, a kind of evaluation of teachers' abilities by students could be devised.
- 7.19 Before new institutions are opened, adoption of AICTE scales of pay should be insisted upon.
- 7.20 Legislation should be enacted to ensure that a part of Industry's profits is earmarked for research in institutions.
- 7.21 To ensure uniformly high standards of all institutions, a national accreditation system should be evolved. Recognition should be accorded only to those institutions coming up to the prescribed standards.



Annexure 1

List of the participants in the Seminar on  
Technical Education, held at the I.I.T.  
New Delhi, from 15th to 17th October, 1965.

1. Prof. R.M. Advani, Malaviya Regional Engineering College, Jaipur.
2. Prof. S.V.C. Aiyar, Indian Institute of Science, Bangalore.
3. Shri Ziauddin Ansari, Principal, College of Engg. & Tech., Muslim University, Aligarh.
4. Dr. B.K. Ahuja, Asstt. Prof. of Mech. Engg., I.I.T., New Delhi.
5. Brig. S.K. Bose, Director, I.I.T., Bombay.
6. Shri J.R. Bimbrahw, Prof. of Mech. Engg., Delhi College of Engg. Delhi.
7. Prof. R.E. Bedford, Acting Head of Elec. Engg. Department, I.I.T., Bombay.
8. Shri L.S. Chandrakant, Jt. Educational Adviser, Ministry of Education, New Delhi.
9. Shri G.K. Ghandiramani, Addl. Secretary to the Govt. of India, Ministry of Education, New Delhi.
10. Shri J.P. Chaudhury, Principal, Bihar Institute of Technology, Sindri.
11. Shri A.K. Chatterjee, Principal, Birla Institute of Technology, Ranchi.
12. Dr. T.G.K. Charlu, Director of Technical Education, Uttar Pradesh, Kanpur.
13. Shri G.R. Damodaran, Principal, P.S.G. College of Technology, Coimbatore.
14. Dr. D.R. Dhingra, Nawabganj, Kanpur.
15. Shri J.F. McDougall, Associate Secretary, Education Commission, New Delhi.
16. Dr. T.A. Desai, Director of Technical Education, Gujarat State, Ahmedabad.
17. Dr. V.M. Dekras, Director of Technical Education, Madhya Pradesh, Bhopal.

18. Prof. C. S. Ghosh, University of Roorkee, Roorkee.
19. Shri M.K. Ganesan, Principal, Central Polytechnic, Madras.
20. Dr. S.K. Baruah, Director of Technical Education, Assam, Shillong.
21. Shri M.R. Srinivasa Iyengar, Principal, Polytechnic for Women, Bangalore.
22. Prof. P.V. Indiresan, Elec. Engineering, I.I.T., New Delhi.
23. Shri K.L. Joshi, Secretary, University Grants Commission, New Delhi.
24. Shri M.L. Jain, Thapar Institute of Engg. & Tech., Patiala.
25. Dr. Jai Krishna, University of Roorkee, Roorkee.
26. Shri D.N. Jayakar, Principal, Government Polytechnic, Lucknow.
27. Dr. C.S. Jha, Head of the Elec. Engg. Department, I.I.T. Delhi.
28. Dr. M.K. Jain, Head of the Maths Department, I.I.T. Delhi.
29. Dr. H.K. Keshavan, Head, Computer Centre, I.I.T. Kanpur.
30. Dr. V.G. Kol-andaiswamy, Prof. of Hydraulics, College of Engg. Guindy, Madras.
31. Dr. B. Karunes, Department of Mech. Engg., I.I.T. Kanpur.
32. Shri V.K. Kelkar, Principal, Walchand College of Engg. Sangali.
33. Dr. P.K. Kapiti, Assoc. Prof. of Physics, I.I.T., Delhi.
34. Prof. B.K. Kaul, Department of Civil Engg., I.I.T., Delhi.
35. Prof. V. Lakshminarayanan, Director, Birla Institute of Technology & Science, Pilani.
36. Dr. S.P. Luthra, Head of the Deptt. of Applied Mech., I.I.T. Delhi.

37. Prof. J.N. Moudgill, Principal, Maulana Azad College of Techn., Bhopal.
38. Prof. P.J. Madan, Province-Chancellor, M. S. University of Baroda.
39. Shri S.K. Mittal, Secretary, Board of Technical Education, U.P. Lucknow.
40. Prof. S. Nagarathanam, Prof. of Applied Mech. Regional Engineering College, Warrangal.
41. Shri R.C. Narayanan, Head of the Deptt. of Elec. Engg., Delhi College of Engineering, Delhi.
42. Prof. G.K. Ogale, Principal, College of Engineering, Poona.
43. Shri R. Narayanan, Head of the Deptt. of Civil Engineering, Delhi College of Engineering, Delhi.
44. Prof. A.C. Roy, Principal, Bengal Engineering College, Howrah.
45. Shri S. Rajaraman, Director of Technical Education, Kerala, Trivandrum.
46. Prof. C.K. Ramesh, Prof. of Civil Engineering, I.I.T., Bombay.
47. Dr. V. Ramakrishna, Head of Deptt. of Chemistry, I.I.T. Delhi.
48. Dr. S.R. Sengupta, Director, I.I.T. Kharagpur.
49. Shri M. Sengupta, Principal, Engineering College, B.H.U. Varanasi.
50. Dr. T. Sen, Vice-Chancellor, Jadavpur University, Calcutta.
51. Shri G.P. Sinha, Principal, Technical College, Dayalbagh, Agra.
52. Prof. B.R. Seth, Head of the Deptt. of Maths, I.I.T. Kharagpur.
53. Shri Y. Saran, Principal, S.V. Government Polytechnic, Bhopal.
54. Shri K.A. Shenoy, Superintendent of Training, Jamshedpur Technical Institute, Jamshedpur.
55. Shri S.C. Sen, Principal, Delhi College of Engineering, Delhi.

56. Shri S.N. Sengupta, Principal, Calcutta Technical School, Calcutta.
57. Shri A.C. Sen, Chief Inspector of Technical Education, West Bengal, Calcutta.
58. Dr. D.N. Singh, Principal, Regional Institute of Technology, Jamshedpur.
59. Shri K.N. Sundaram, Chief, Engineering Manpower Survey, Institute of Applied Manpower Research, New Delhi.
60. Prof. L.D. Smullin, Kanpur Indo-American Program, I.I.T. Kanpur.
61. Dr. M.S. Sodha, Prof. of Physics, I.I.T. Delhi.
62. Prof. Saranjit Singh, Assoc. Prof. Civil Engineering, I.I.T. Delhi.
63. Dr. N.M. Swami, Head of Textile Department, I.I.T. Delhi.
64. Shri A.R. Dawood, Member, Education Commission, New Delhi.
65. Miss S. Panandikar, Member, Education Commission, New Delhi.
66. Shri S. Venkatesh, Deputy Secretary, Education Commission, New Delhi.
67. Dr. H.C. Visvesvaraya, Indian Standards Institute, New Delhi.
68. Donald W. Myers, University of Michigan, Ann Arbor, Michigan, U.S.A.
69. Dr. P.K. Aditya, Asstt. Prof. of Physics, I.I.T. Delhi.
70. Dr. Philip H. Haney, U.S.A.I.D., New Delhi.
71. Prof. D. Welch, I.I.T. Kanpur.
72. Prof. W. Brown, I.I.T. Kanpur.
73. Prof. A.J. Erickeon, I.I.T., Kanpur.